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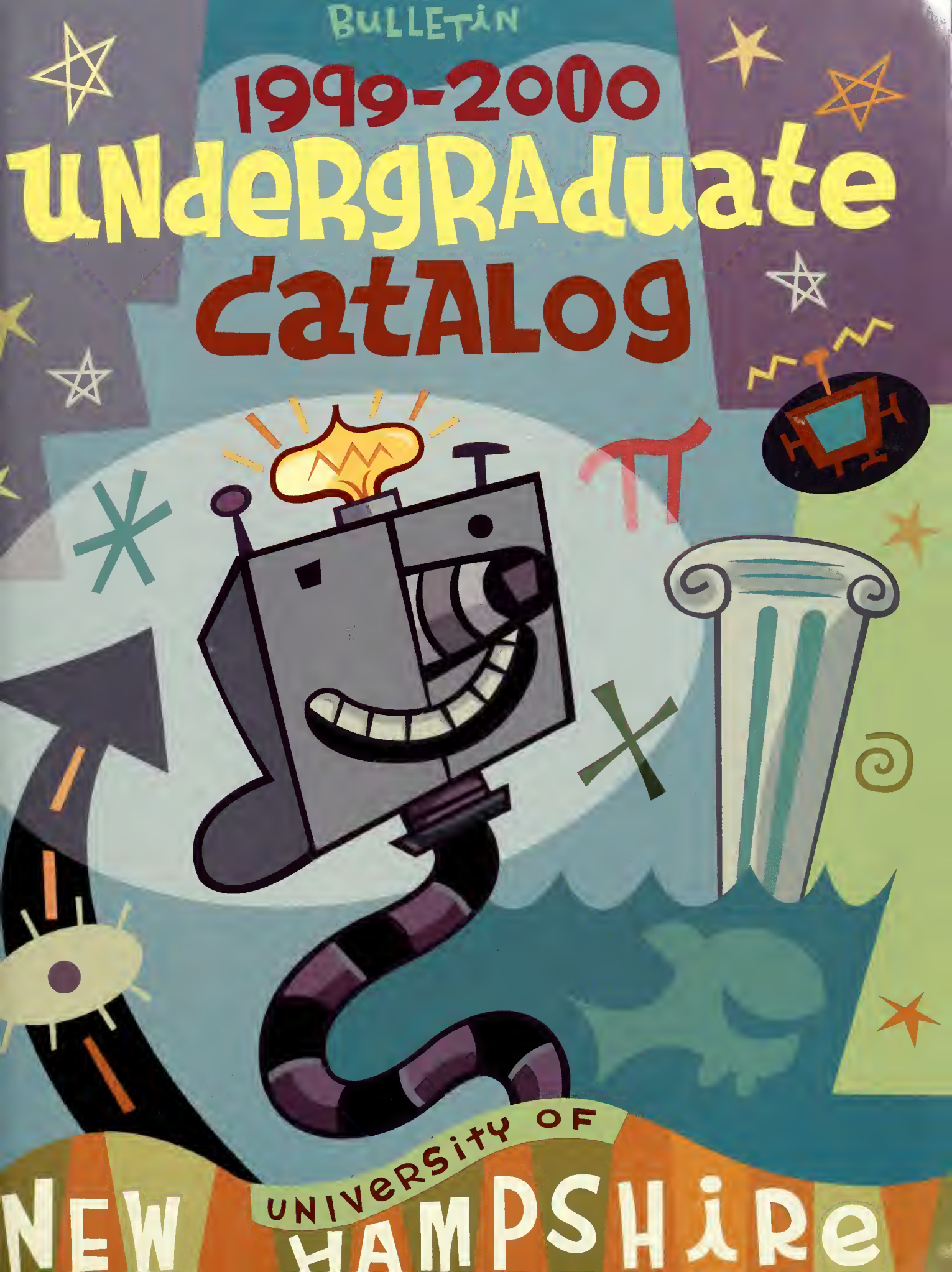
BULLETIN

1999-2000 UNDERGRADUATE CATALOG



UNIVERSITY OF NEW HAMPSHIRE

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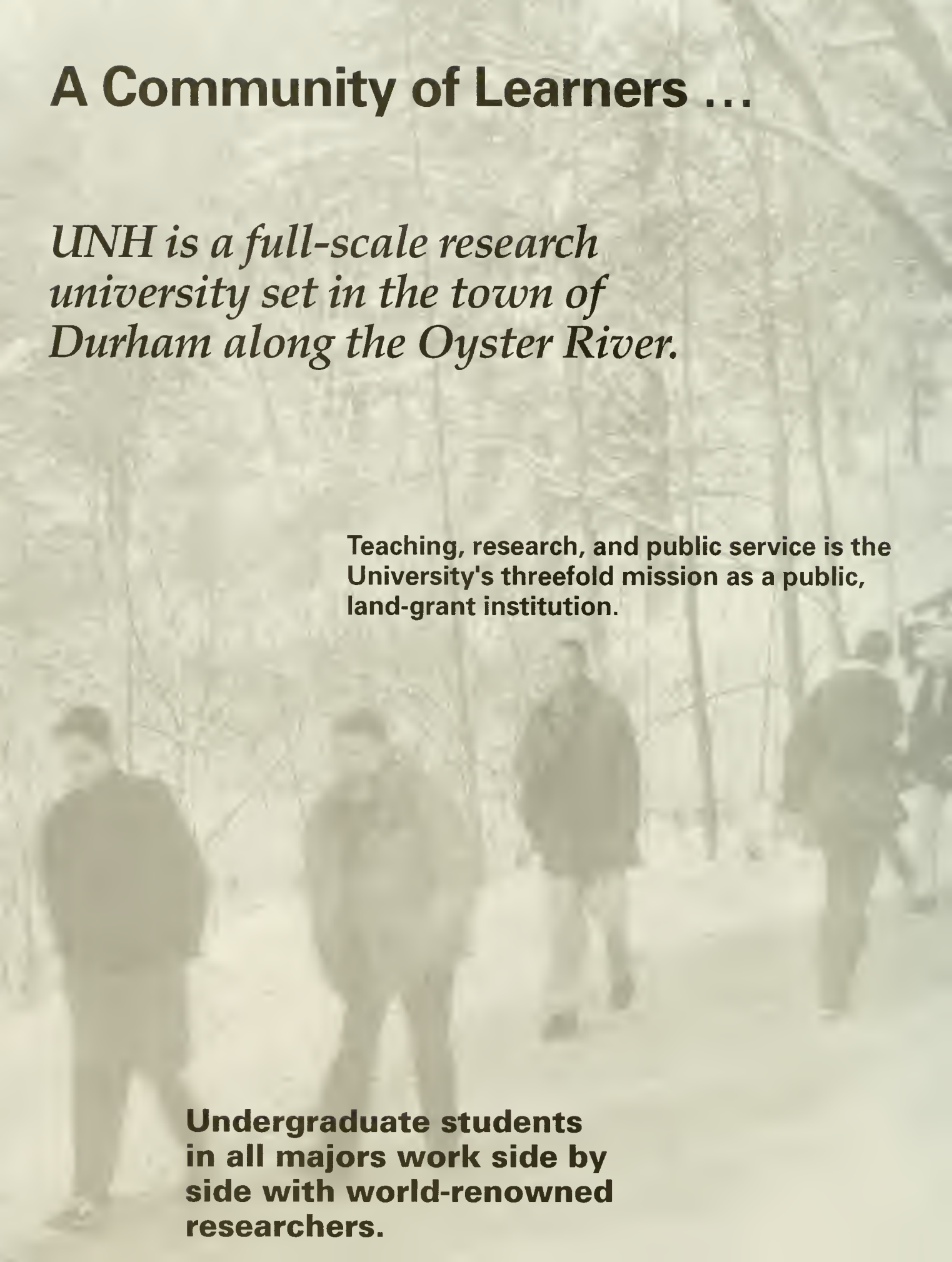
1999–2000 Calendar . . Inside Back Cover

A Community of Learners ...

UNH is a full-scale research university set in the town of Durham along the Oyster River.

Teaching, research, and public service is the University's threefold mission as a public, land-grant institution.



Undergraduate students in all majors work side by side with world-renowned researchers.

UNH's General Education Program builds a foundation in the liberal arts and sciences—no matter what major.

A $19-million renovation to Dimond Library gives students new settings and equipment for study and research and includes 126 computer workstations as well as laptop computer hookups.

There's a place at UNH for YOU.

Choosing UNH

For more information or to arrange a visit contact:

University of New Hampshire
Office of Admissions
Grant House
4 Garrison Avenue
Durham, NH 03824-3510
(603) 862-1360

http://www.unh.edu

The University

The University of New Hampshire is a public land-, sea-, and space-grant university serving an undergraduate population of 10,434 students and 1,775 graduate students. A rising star among research universities, the University retains the look and feel of a New England liberal arts college with a faculty dedicated to teaching.

Within its seven schools and colleges, the University offers 2,000 courses in more than 100 majors; special programs include a particularly strong undergraduate research program, the Honors Program, and a wide range of opportunities for internships, study abroad, and national exchange experiences.

In 1998, UNH completed a $19-million renovation of the 207,000-square-foot Dimond Library at the center of campus. The campus also has a recently completed journalism laboratory; a renovated student union building, which includes two theatres, a food court, and a variety of services and entertainment; and a sports complex featuring a 6,000-seat sports arena, concert hall, and new recreation center. For more information about the University, visit the UNH Web site at http://www.unh.edu/ where you will find links to academic departments and services, student and admissions information, and a search feature.

History

Founded in 1866 as the New Hampshire College of Agriculture and the Mechanic Arts, the University of New Hampshire was one of the early land-grant institutions established to serve the sons and daughters of farming and laboring families.

First situated in Hanover in connection with Dartmouth College, New Hampshire College moved to its Durham campus in 1893 after Benjamin Thompson, a prosperous farmer, bequeathed land and money to further the development of the college.

In 1923 the state legislature granted the college a new charter as the University of New Hampshire, composed of the College of Agriculture, the College of Liberal Arts, and the College of Technology.

In 1963, the University System of New Hampshire was created when the state colleges at Plymouth and Keene were brought under the same board of trustees as the University.

In 1984, the University began offering courses to residents of the most densely populated region of the state through the Nashua Center. In 1985, the state legislature incorporated the University of New Hampshire at Manchester. The college offers selected baccalaureate and graduate programs for commuter students in the Merrimack Valley region as well as credit and noncredit continuing education courses.

Mission

UNH offers a broad array of undergraduate, professional, and research and graduate programs.Nearly ninety percent of the full-time faculty members hold doctoral or terminal degrees, and many have earned national and international reputations.

The University of New Hampshire has a threefold mission: the scholarly functions of teaching, research, and public service.

Teaching. All undergraduate programs of instruction at the University are built on a program of general education. The objectives of general education carry through the undergraduate subject major, as students refine and apply their skills and discover the relationships among fields of study. At every level, students enjoy close contact with individual faculty members who are dedicated to research and scholarship; this is an advantage for students, because active scholars and researchers teach by sharing their own learning.

Research. The activity of research embraces all the arts and sciences at the University: it is an integral part of both undergraduate and graduate programs. In doctoral study, and in many master's programs, thesis research is a primary mode of learning. As a land-grant, sea-grant, and space-grant institution, the University of New Hampshire has a special obligation to conduct applied research in the areas of agriculture, engineering, and marine sciences, and to disseminate the findings to the state and nation.

Public Service. The University fulfills its special responsibility for the welfare of the state through UNH Cooperative Extension, through the Division of Continuing Education, and through research

and consultation on particular needs of New Hampshire citizens. The University is dedicated to collaborative learning inside and outside the classroom.

The Campus

The home of the main campus of the University is Durham—one of the oldest towns in northern New England—near the picturesque seacoast of New Hampshire.

The 200-acre campus is surrounded by more than 2,400 acres of fields, farms, and woodlands owned by the University. A stream flowing through a large wooded area in the middle of campus enhances the natural open space among the buildings.

College Woods, on the edge of campus, includes five miles of well-kept paths through 260 acres of woods.

The *University Library* houses more than 1.1 million volumes, 6,500 periodical subscriptions, a million government documents, patents, maps, sound recordings, compact disks, video cassettes, manuscripts, and other related material. Electronic resources include EBSCOhost, which provides indexes to general, academic, and business periodicals; LexisNexis, which accesses a wide variety of news and legal information; and PubMed, which contains nine million citations to medical materials.

The new Dimond Library contains three grand reading rooms, flooded with light from banks of windows and skylights. It is equipped with more than 200 connections for laptop computers and 124 computers which allow students to use the library's elecronic resources and those of the Internet, with expansion possible to more than 400 computers.

Specialized subject collections in chemistry; mathematics, engineering, and computer sciences; biological sciences; and physics are housed in four branches administered by a physical sciences librarian and a biological sciences librarian.

Computing facilities; the student union; and the Whittemore Center, a recreation, sports, and entertainment complex, are described in the campus life and student services sections.

Visual and performing arts are accommodated in the Paul Creative Arts Center, which contains the Art Gallery and two theatres; in the Whittemore Center; and in the student union.

Research facilities are extensive and serve every field of academic endeavor. Information is available from the departments involved.

The campus of the *University of New Hampshire at Manchester* is located at two sites, French Hall on Hackett Hill and the University Center in the city's historic millyard area.

Accreditation

The University of New Hampshire is accredited by the New England Association of Schools and Colleges, Inc., which accredits schools and colleges in the six New England states. Accreditation by the association indicates that the institution has been carefully evaluated and found to meet standards agreed upon by qualified educators. Specialized programs of study are also accredited by various professional organizations.

All degree programs at the University are approved for veterans' educational benefits. Individuals are encouraged to contact the veterans coordinator in Stoke Hall about specific questions.

The University supports the efforts of secondary school officials and governing bodies to have their schools achieve regional accredited status to provide reliable assurance of the quality of the educational preparation of its applicants for admission.

Admissions

UNH welcomes campus visitors. Prospective students are encouraged to contact the Office of Admissions in order to arrange a recommended interview, campus tour, and/or group information session. Professional staff members are available to assist with visitors' special concerns or questions. In addition, student admissions representatives, who are prepared to provide information about the University and criteria used by the Admission Committee in reviewing candidates, are an integral part of our campus visitor reception activity. Please call the Office of Admissions at (603) 862-1360 for further information, or visit the Web site at www.unh.edu/admissions/

Admission Criteria

Admission to a bachelor's degree program is based upon successful completion of a strong secondary school program of college preparatory coursework. Primary consideration is given to the academic record, as demonstrated by the quality of candidates' secondary school course selections and achievement, recommendations, and the results of a Scholastic Assessment Test (SAT-I) or results from the American College Testing program (ACT). Consideration is also given to character, initiative, leadership, and special talents.

Most successful candidates present at least four years of English and mathematics, three or more years of laboratory science, two or more years of social science, and at least three years of study in a single foreign language or more than one year of study in two different languages. Recommended mathematics preparation includes the equivalent of algebra I, geometry, algebra II, and trigonometry or advanced math.

Students who plan to specialize in engineering, biological/physical science, mathematics, or forestry should present at least four years of mathematics including trigonometry, as well as laboratory coursework in chemistry and/or physics. Students pursuing business-related studies should have also completed four years of mathematics including trigonometry. For students planning to major in health-related disciplines, four years of math, as well as laboratory courses in biology and chemistry, are strongly recommended.

Applicants may indicate a prospective major on the application for admission. Undecided applicants may apply for admission as an "undeclared" student for each of the University's five school and college divisions in Durham and at UNH Manchester.

[For information concerning bachelor and associate degree programs offered through UNHM, see the section on the University of New Hampshire at Manchester (page 112).]

Many University students request a change in major during their undergraduate years, and most are approved. These changes are possible after a student has been at the University for at least a semester and has permission from the appropriate college dean and department chairperson. In recent years, however, the University has not always been able to honor all requests for a change of major, most notably into biological sciences, computer science, environmental conservation, nursing, occupational therapy, and wildlife management.

Admission Test Requirements

All candidates for admission to bachelor's degree programs are required to submit the results of an SAT-I or the ACT. SAT-II tests are not required, but a foreign language subject test may satisfy the foreign language requirement of the bachelor of arts degree programs. Required scores vary by test.

International students whose primary language is not English must submit the results of a Test of English as a Foreign Language (TOEFL). The recommended minimum TOEFL score is 213 on the new scoring method.

Art and Music Candidates

Candidates applying to any program within the Department of the Arts (except art history) are required to submit a portfolio to the department chairperson (603) 862-2190. Candidates applying for programs in the Department of Music must make arrangements with the department chairperson for an audition (603) 862-2404. Details regarding portfolio or audition requirements may be obtained from the departments.

Early Readings of Admission Eligibility

The Admissions Office welcomes high school students who seek fall-semester freshman admission *to apply anytime after the start of the senior year and before the February 1 priority deadline.* Admission notifications are provided on a continuous basis through April 15th. Admitted freshmen have until May 1 to confirm their intent to enroll at the University.

The review of freshman candidates begins as soon as a complete application (including official grade reports through junior year and a confirmed senior-year course schedule, the results of the SAT-I or ACT, and a counselor's letter of recommendation) is on hand. To ensure an "early reading" by January of the senior year, candidates are encouraged to submit admission applications by December 1. In some cases, the Admission Committee will request senior mid-year grade reports in order to resolve an admission decision.

All positive admission decisions made prior to the completion of a candidate's coursework in progress are considered "provisional" and are subject to the verification of satisfactory senior year achievement when final high school transcripts are reviewed by the Admission Committee.

Accepted candidates are required to confirm their intention to enroll with the payment of an enrollment fee ($300) by May 1. An additional $200 deposit is required by May 1 to reserve on-campus housing.

Deferred Admission

The University considers applicants for deferred admission, which enables students to reserve a space at the University while taking time off from school for work or travel. The University may not be able to offer deferred admission in certain program areas.

Advanced Standing

The University recognizes outstanding secondary school work by means of advanced placement and credit for those who have taken enriched or accelerated courses before entering college. Applicants qualify for such credit by successfully completing coursework for college credit and satisfactory achievement on University approved placement examinations, including the College Board Advanced Placement (AP) Tests, or through the College Level Examination Program (CLEP).

The University accepts AP Tests in every subject area, with credit and course equivalency based on the score achieved. Contact the Office of Admissions for further information (603) 862-1360.

The University recognizes the College Level Examination Program. Up to 32 semester credits of General Examination tests may be applied as elective credit only. Scores must be 500 or better in the humanities, natural sciences, and social sciences-history exams. The minimum score for mathematics is 500 and for the English exam with essay, 500. Subject exams, when applicable, may be used to satisfy either departmental or general education requirements. UNH does not accept all CLEP subject exams.

Maximum credit accepted for all credit by exam and advanced placement testing is 64 semester hours.

Associate Degree Candidacy

The University accepts candidates for associate in applied science and associate in arts degree programs who have demonstrated ability and motivation for learning through academic achievement, work experience, and/or military service.

Students may be considered for admission to associate in applied science degree programs offered by the University's Thompson School of Applied Science. Candidates applying as high school seniors must submit the results of an SAT-I or an ACT. Students granted freshman admission to the Thompson School are eligible to live in a University residence hall.

The University offers an associate in arts degree program through the Division of Continuing Education. Associate in Arts degree candidates are not guaranteed housing but may contact the Department of Housing (603) 862-2120 to explore possibilities.

Eligibility for Degree Candidacy

Applicants who meet the appropriate requirements for admission may become candidates for any undergraduate degree offered by the University. However, applicants having a bachelor of arts degree will not be admitted into a program of study that awards the same degree (e.g., B.A., History, and B.A., Zoology). Applicants can earn more than one bachelor of science (B.S.) degree, provided that each degree is in a different field. Applicants may also be admitted into a program awarding a different degree (e.g., B.A., History, and B.S., Biology; or B.A., History, and A.A.S., Applied Business Management).

Readmission

An undergraduate who withdraws, does not register for UNH coursework in a given semester, or is suspended or dismissed from the University thereby terminates degree candidacy and must apply for readmission by the following deadlines: fall semester, June 1; spring semester, November 1. Readmission applications are processed in the Office of Admissions; however, decisions regarding readmission are made in consultation with the Division of Student Affairs and the dean's office of the University college division to which the student is applying.

Before seeking readmission, suspended students must remain away from school for at least one semester. Applications from suspended students should include a statement about the applicant's readiness to resume University work.

Only under extraordinary circumstances will students be readmitted after dismissal for academic reasons. Applications submitted by dismissed students are reviewed by the University's Academic Standards and Advising Committee.

It may not be possible for readmission applicants to enroll in programs with established enrollment limitations.

Transfer Students

UNH encourages applications from transfer students. Admission consideration includes review of course selection and the extent to which that selection addresses the University's general education requirements. Transfer credit is awarded for completed courses with a grade of C or better, provided those courses are comparable to courses offered at UNH. Each course must carry at least 3 semester credits to qualify for general education consideration. Transfer credit evaluations are provided with the offer of admission.

Students enrolled in one of the University's associate degree programs who desire admission to a bachelor's degree program at UNH apply as transfer students through the Office of Admissions.

Some programs may have enrollment limitations. Transfer students may contact the Department of Housing (603) 862-2120 to determine the availability of on-campus housing.

Priority deadlines for transfer applicants are November 1 for the spring semester and March 1 for the fall semester.

No portion of a student's grade-point average will transfer; that is, external averages will not be calculated with UNH grades.

New England Regional Student Program

The University participates in the New England Regional Student Program, in which each state college and university in New England offers certain undergraduate majors to students from other New England states. Under this program, admitted students pay the UNH in-state tuition plus an additional percentage. Students must indicate on the application the specific major for which they are applying. Information about the curricula may be obtained from the New England Board of Higher Education, 45 Temple Place, Boston, MA 02111, or call (617) 357-9620.

Special Student Status

UNH offers a special student classification for persons who wish to participate in University coursework without entering a degree program. Special (nondegree) students register for coursework through the University's Division of Continuing Education In evaluating requests for full-time status, the Office of Admissions generally applies the same criteria used in the review of applicants for admission to degree candidacy. Special students have full access to the academic advising services within the division. Students must maintain satisfactory achievement to continue with University coursework.

Resident Status

All students attending any division of UNH in any capacity shall be charged tuition at a rate to be determined by their primary, legal domicile. Those domiciled within the state of New Hampshire pay the in-state rate. Those domiciled elsewhere pay the out-of-state rate.

Students are classified as residents or nonresidents for tuition purposes at the time of admission to the University. The decisions, made by the Office of Admissions, are based upon information furnished in students' applications and any other relevant information.

All applicants living in New Hampshire are required to submit a notarized statement to the effect that they, if financially independent, or their parents, if financially dependent, have been legally domiciled in New Hampshire continuously for a period of at least twelve months immediately prior to registering for the term for which the student is claiming in-state status. Students admitted from states other than New Hampshire or from foreign countries are considered nonresident throughout their attendance at the University unless they have acquired bona fide domicile in New Hampshire.

If students maintain residency apart from that of their parents, they must clearly establish that they are financially independent and that their residence in New Hampshire is for some purpose other than the temporary one of obtaining an education at the University. To qualify for in-state status, students must have been legally domiciled in New Hampshire continuously for a period of at least twelve months prior to registering for the term for which in-state status is claimed.

The burden of proof in all cases is upon the applicant. The University reserves the right to make the final decision concerning resident status for tuition purposes.

A copy of the rules governing residency may be obtained from the Office of Admissions.

Financial Aid

The University Financial Aid Office assists students who are unable to meet educational expenses entirely from their own family resources. Aid is available in the form of grants and scholarships, loans, and part-time employment. The financial aid catalog, *Scholarships and Grants*, contains a listing of scholarships available from endowments, special programs, and gifts. The financial aid brochure gives program information, application procedures, and deadlines.

In many communities, scholarships and loans are available locally. School principals and guidance counselors have information about these sources of assistance, which are available to both high school seniors and adult students.

Before applicants may be considered for assistance by the University, they must submit the Free Application for Federal Student Aid (FAFSA). Applicants may obtain the FAFSA from local high schools or from the UNH Financial Aid Office.

The financial aid application deadline for the 1999–2000 academic year for aid awarded by the University is March 1, 1999. This is the date by which your *fully completed* FAFSA must be received by the federal processor.

The importance of meeting this deadline cannot be overstated. While there are some types of aid (e.g., Pell Grants and Stafford Loans) for which you may apply after this deadline, it is likely that you will receive substantially less total aid if your application is late. For the past several years, applicants applying after the deadline did not receive any aid

awarded by UNH (SEOG, tuition grant, Perkins Loan, or work study).

It is the University's position that the student applicant is accountable for the accuracy and timely submission of the FAFSA. We realize that in most cases a student's parent(s) also participates in completing the form. However, the student's ultimate responsibility for monitoring the application process. Students should not wait until being admitted to the University before applying for financial aid.

Note: There is reference on the FAFSA to a "deadline" of May 1, 2000. Do not be misled by this date. This is simply the last date on which the federal processor will accept the form. It is *not* the financial aid deadline at UNH or most other colleges.

Grants and Scholarships

Admitted undergraduate degree candidates who will attend UNH on a full- or part-time basis may be considered for tuition grants and University scholarships. The basic consideration is financial need, although some scholarships are awarded on the basis of scholastic attainment, participation in extracurricular activities, or meeting specific requirements of a donor.

The University participates in the federally sponsored Federal Supplemental Educational Opportunity Grant Program, which is designed to assist needy students who are admitted degree candidates.

Federal Pell Grant Program

Students may apply directly to the federal government for a Pell Grant using the FAFSA. Students must reapply each year for a grant.

Loan Programs

Two loan funds are administered by the University: UNH Loan Fund and Federal Perkins Loans. Admitted undergraduate and graduate degree candidates who will attend the University on at least a half-time basis may be considered for these loans. Financial need must be clearly demonstrated, and loans may be used only for educational expenses.

Most states now have higher education loan plans established by the Higher Education Act of 1965. Contact your local bank, other lender, or the Financial Aid Office for information.

Part-Time Employment

The Federal Work-Study Program, both academic year and summer, assists students who, as determined by the Financial Aid Office, need financial assistance for their educational expenses. Admitted undergraduate and graduate degree candidates attending at least half time are eligible for consideration.

Students who do not qualify for the Work-Study Program may find part-time employment on or near campus.

ROTC Scholarships

ROTC scholarships are offered on a competitive basis by both the Army and Air Force. Entering freshmen may compete for four-year scholarships during the last year of high school. Students in both the four-year ROTC program and the two-year program compete for scholarships covering their remaining academic years. Scholarships pay up to full tuition, all mandatory University fees, and required textbooks for all courses. Limits may be placed on these scholarships depending on the type and amount of expenses incurred. In addition, all scholarship recipients receive a tax-free $150-per-month subsistence allowance. Administrative and medical requirements must be met to be eligible for a scholarship.

Students with either a four-year or three-year ROTC scholarship will receive a room and board grant for the entire time they are on the scholarship.

Campus Life

Housing

The University offers students a variety of housing options, including small halls of approximately 100 students to medium halls and large halls (ranging from 400 to 600 students). Some halls are single sex; others are coeducational. Upperclass undergraduates may also choose from either of two on-campus apartment complexes-the Gables and Woodside apartments. These apartment complexes are designed to meet the more independent and self-reliant life-styles of upperclass students. Special-interest housing is offered in the minidorms (each dorm focuses on a theme) and in Smith Hall, where the focus is on international and intercultural activities. There is also a residence hall for students participating in SELF (Students Electing to Live Free), a program whose participants have chosen not to use alcohol or any chemical substances. Graduate and family housing are available.

The Department of Housing and the Residential Life Office are committed to providing a living environment that maintains high standards of health and safety. Full-time professional directors manage the residence halls and work with a student staff to offer special programs and enforce hall standards.

Undergraduate University housing is available to all full-time baccalaureate degree candidates and is available to associate in applied science degree candidates on a space-available basis. Offers of housing to associate in arts degree and Division of Continuing Education students are made on a case-by-case basis. Students are not required to live on campus.

Offers for on-campus housing are sent to all accepted new freshmen. Transfer and readmitted students may apply for housing upon admission to the University. Offers will be made on a space-available basis. All application materials are available at the Department of Housing located in Pettee House.

For more information, contact the Department of Housing (603) 862-2120.

Dining

There are three dining halls on campus, one in each of the three areas. All three dining halls are open for continuous service from 7:15 A.M. to 3:00 P.M. and from 4:15 P.M. to 6:30 P.M., Monday through Friday. Continental breakfast (8:00 A.M.-10:00 A.M.), brunch (10:00 A.M.-1:30 P.M.) and dinner (4:15 P.M.-6:30 P.M.) are offered on weekends. Several entrees are offered at each meal including both vegetarian and vegan choices, deli and salad bars, choice of soups, desserts, and more. Students may "bag-a-meal" if they are unable to make it to the dining hall for lunch or dinner. Students can use their meal plan for a meal exchange at the MUB Food Court, Wildcatessen, and the New England Center Acorns Restaurant during select hours. After hours, Prime Time is available in the Wildcatessen

(Stillings Hall, 7 P.M.-10 P.M.), the MUB Food Court (7 P.M.-9:30 P.M.), Sunday-Thursday; and the New England Center Acorns Restaurant (7 P.M.-9:30 P.M.).

Students living in undergraduate residence halls must select either a 19, 14, or 10 meals/week plan. The 19 and 14 meals/week may be used seven days a week; however, the 10 meal/week plan may only be used Monday-Friday. Students living in undergraduate apartments or off compus may choose to purchase any of the meal plans offered. In addition to the plans offered to on-campus students, off-campus students may choose the 50 Basic, the 50 Plus, the 125 Basic, or 125 Plus.

On Tray, a newsletter distributed weekly, publishes the week's menu and articles about nutrition as well as special dining and campus activities. In addition, a healthy choice meal guide is published each week. A registered dietician is also available for private consultation. Students with special nutritional considerations are advised to meet with the dietician before committing to a meal plan and dormitory housing.

As new items are added to the menu or as recipes change, we make every effort to alert customers of changes. It is the responsibility of customers with food allergies to make the final judgement on whether or not to question the ingredients of a food item or to choose to eat foods selected. Please ask any Dining associate questions about ingredients at any time.

To learn more about UNH Dining, call (603) 862-1821 or visit our Web site at http://www.unh.edu/dining/index.html

Memorial Union Building

The Memorial Union Building (MUB) is the University's community center. The union provides opportunities for student involvement and offers space for programs, meetings, and study, as well as for major public events, movies, and other entertainment. Students, faculty and staff serve on the Memorial Union Board of Governors and work with the director to set policies and establish the budget for the building's operation. The original building was a gift from UNH alumni and is the official state war memorial.

Headquartered in the MUB are the Information Center; Wildcards, a convenience and card store; the UNH Copy Center; the UNH Bookstore; the Ticket Office; specific lounge/study space for both nontraditional and graduate students; and Granite Square Station, the undergraduate mail center. Computing and Information Services provides a computer cluster, and help desk with walk-in service. The Games Room is equipped with pool and ping pong tables, table soccer, video games, and lounge space with large screen T.V. The Entertainment Center provides a comfortable atmosphere for relaxing with live performances as well as socializing and study space. The Food Court offers expanded dining options and food service is also available in the Coffee Office. The Student Senate Office; WUNH-radio; *The New Hampshire*, the student newspaper; and nearly 60 other student organizations have office space in the MUB.

The Office of the Memorial Union is responsible for the registration and recognition of more than 130 student organizations and assists students with the mandatory registration process. Memorial Union staff members assist in the coordination of their activities and adherence to student rights and rules. Learning opportunities are provided through leadership and management skills conferences. Staff members are available for advising and assistance with publicity, recruitment, and advertising for student events. The Memorial Union staff members work on a variety of programs in conjunction with student organizations such as Jukebox, daytime programming, University events, and weekend programming.

Recognized student organizations and University departments are encouraged to use rooms in the MUB. Reservations are arranged through the MUB Scheduling Office, (603) 862-1526. For a complete listing of Memorial Union programs, services, and events, phone the Information Center at 862-2600 or visit the Web site at http://www.unh.edu/mub

Cultural Events

Students at the University can participate in a rich cultural life. In addition to the numerous lectures, films, concerts, meet-the-artist receptions, master classes, and University theatrical productions offered throughout the year, the UNH Celebrity Series and exhibitions at the Art Gallery bring artists of international stature to campus. The Celebrity Series offers UNH students a discount subscription entitling them to attend seven events for as little as $98, versus the general non-subscription price of $200. For a brochure, call (603) 862-3227. The arts at UNH are an important part of undergraduate education, and programs are frequently incorporated into coursework.

Campus Recreation

Many opportunities for leisure activities, regardless of skill or ability, are offered through Campus Recreation. In addition to intramurals, sport clubs, and fitness programs, informal recreation is available to all degree candidates with student IDs. Others must purchase a University recreation pass at the service desk in the Hamel Recreation Center.

The new Whittemore Center combines this state-of-the-art student recreational facility with an Olympic-size hockey rink that converts to a basketball court or to a venue for major concerts and performances.

The recreational facilities include two multipurpose athletic courts, squash and racquetball courts, aerobics and martial arts studios, an 8,000-square-foot fitness center with more than 100 exercise stations, three basketball/volleyball courts, an indoor track, a lounge, a club room, and locker rooms with saunas.

The University also has both indoor and outdoor pools and numerous playing fields, a sailing center located at an outdoor recreation area in Barrington, and a crew boat house.

Programs and Services for Students

Advising and Counseling Services

Every UNH student is assigned an academic adviser, who provides help in choosing courses and planning a program of study. Each college within the University also has an advising office. Other sources of help, for academic or personal problems, are described below.

University Advising Center

The University Advising Center, Hood House, 862-2064, provides academic advising for undeclared students and se-

lected majors in the College of Liberal Arts. The advising center has three full-time advisers and a director to assist students with program selection. Students are encouraged to use their period of undeclared status to explore areas of study that will help them select a major.

The advising center coordinates the services of part-time faculty advisers representing the schools and colleges on campus. Each faculty member, available for appointments at the center, can give students the most current information on specific majors and departmental requirements.

Center for Academic Resources

The Center for Academic Resources offers a comprehensive program of academic-related services to undergraduate students. Participants work on an individual basis or in group seminars with trained staff members to improve their academic performance and enhance their educational experience. The center offers learning skills instruction, drop-in subject area tutoring, computer support, course information, clarification of academic goals, personal advising, and referral. The center serves approximately 1,600 students a year. There is no cost associated with these services.

Additional services are available through the Student Support Services component for students enrolled in four-year programs who meet income and disability criteria. These services include individualized subject-area tutoring, support for students with learning disabilities, graduate school advising and preparation, and scholarship search assistance. Student Support Services is 100 percent federally funded through a $212,619 grant from the U.S. Department of Education.

Located at Wolff House (8 Ballard Street, next to Health Services), the center is open weekdays from 8:00 A.M. to 4:30 P.M. and on Wednesday evenings. Call (603) 862-3698 for further information.

Counseling Center

The Counseling Center offers confidential professional consultation, individual and group therapy, and educational workshops for a broad range of emotional, psychological, and interpersonal concerns. Services are provided for all students who have paid their Health Services/Counseling fee and who may be facing a major crisis, confusion, depression, family difficulties, or other personal problems.

The center provides a scheduled intake system. Intake appointments can be made over the phone or in person. In addition, emergency services are offered by the Counseling Center during regular business hours, 8:00 A.M.–5:00 P.M., Monday through Friday, and after hours by calling the Counseling Center at (603) 862-2090 or Health Services at (603) 862-1530. When necessary, the center's staff assists with outside mental health referrals.

The staff, which includes certified psychologists, counselors, and consulting psychiatrists, is committed to the welfare and development of UNH students. The staff is available for consultation with faculty, administrative staff, and parents on matters relating to the welfare of students. The Counseling Center is fully accredited by the International Association of Counseling Services, Inc. and offers a predoctoral internship training program that is accredited by the American Psychological Association.

All information about a student's visits to the Counseling Center is confidential and cannot be released without the written permission of the student.

For information or to schedule an appointment, call (603) 862-2090 or visit the Counseling Center's Web page at http://www.unhcc.unh.edu/index.html

Athletics, Men's and Women's

UNH participates in the following intercollegiate men's athletics programs: basketball, cross country, football, hockey, skiing, soccer, swimming, tennis, and track and field. UNH also participates in the following intercollegiate women's athletics programs: basketball, crew, cross country, field hockey, gymnastics, ice hockey, lacrosse, skiing, soccer, swimming, tennis, track and field, and volleyball. An undergraduate athletic pass provides access to certain sporting events on a space available basis. (See also Campus Recreation, page 9.)

Career Services

Career Services assists students at every step of their career development. The staff provides assistance in identifying potential careers for the undecided, offers opportunities to explore career possibilities, and aids in securing employment. Interest testing and a computer-aided career decision-making program helps students identify potential majors and careers. A career library, a nationwide parent/alumni career advisers network composed of more than 3,000 members, and an internship office help students explore career possibilities. Job placement opportunities are offered through an on-campus recruiting program and a job notice retrieval telephone system called "UNH Alumni Jobline." An annual career day, graduate school fair, and summer job/internship fair are held to further assist students in career planning. The office also administers national tests for postgraduate schooling. The service is available to all undergraduates and graduate students; early use is encouraged. Learn more about Career Services on the Internet at http://www.unh.edu.career-services/index.html

Noncredit Internships

Supported by the federally-funded Job Locator Development Program, the internship office helps students locate part-time and summer jobs; preprofessional, noncredit internships; and community service jobs. A sampling of all three types of positions are posted on the job board in the Memorial Union Building, and all positions are maintained in binders in the Career Services office.

Internships can take place anywhere, for example, in a business, a research facility, or a wildlife refuge. Positions can last from one to several months, be full or part time, and be paid or unpaid. Students engaged in career-oriented work experiences may earn academic credit through a faculty sponsor associated with their department. Career Services maintains information on a large number of internships.

Students who wish to participate in the internship program, need only consult the job listings, which can be found at Career Services, and apply. Specific internships are also listed on the Career Services Web site at http://www.unh.edu/career-services. For more information regarding internships contact, Career Services, (603) 862-2010.

Cat's Cache

Cat's Cache is a convenient way to make small purchases on campus. It is a prepaid, declining balance that uses the mag-

netic stripe on the University ID card. Accounts may be started with a minimum deposit of $50 made when a student signs up for housing, attends June Orientation, or pays tuition. Cat's Cache balances carry from semester to semester, year to year, until depleted, and they can be added to at any time with cash or check. Full refunds are available upon request-no cancellation fee. There is no monthly service charge and no sign-up fee.

Cat's Cache is accepted at many retail outlets on campus, including the UNH Bookstore and other shops in the Memorial Union Building; campus vending machines; the pro shop at the Hamel Recreation Center; MUB Food Service; the dining halls; New England Center Acorns Restaurant; and the UNH Dairy Bar.

Computing and Information Services (CIS)

Computer access. All students have access to networked computing resources on campus. UNH has three microcomputer clusters which offer more than 220 Dell pentium and Apple Power Macintosh computers as well as high-speed laser printing. All clusters are completely networked and offer a suite of software as well as access to the Internet via the World Wide Web. The clusters are staffed by student consultants who assist with questions or problems. Three clusters are available 24 hours a day. There is also one cluster which provides access to UNH's central systems via terminals. For information and cluster hours call, 862-0058 for an automated recording.

Training. A teaching/learning center in Hamilton Smith Hall provides students with a library of videotapes of the most popular software programs available in the student computing clusters. Students can borrow these videotapes free of charge. Each semester free short courses are offered on a variety of topics. Register for a short course via the Web at http://training.unh.edu. Facilities with Dell pentium and Apple Power Macintosh systems can be reserved by faculty and students for hands-on training. For more information, call (603) 862-3667.

Purchase and repair. Students can purchase their own computers at the Tech Underground, the campus computer store. The Tech Underground offers Apple, Dell, and Acer computers; Apple and Hewlett-Packard printers; and a variety of supplies, peripherals, and software at educational pricing to members of the UNH academic community. Warranty service and computer maintenance and repair are provided through the Computer Service Center. The Tech Underground and the Computer Service Center are located at the CIS Center, Hewitt Annex, 54 College Road.

CIS Help Desk. The CIS Help Desk provides UNH and USNH faculty, students, and staff with a centralized point of contact for computer-related questions and concerns. This group is available for telephone consulting at 862-4242 to address inquiries on a variety of computer applications. Supported products include Macintosh and Windows compatible software, communications, and network products, Internet utilities, central computing applications, and USNH central administrative software applications. In addition to supporting applications, the Help Desk provides administration and support for all central UNH computer user accounts as well as assisting with problems connecting to the UNH central computer systems.

Walk-in Services. The CIS Help Desk coordinates Walk-in Services at the MUB, room 109. This convenient location offers kiosks for accessing e-mail, browsing the Web, and searching the CIS Knowledge Base. Staff are available to discuss issues related to computing at UNH; distribute central system (e-mail) accounts; reset passwords; accept diskettes for virus scanning services, file conversion, disk/file repair and recovery. CD Loaner Kits are available for the distribution of the latest anti-virus software and network software programs used at UNH. This location also coordinates scanning services for exams, surveys, and faculty.

ResNet is UNH's Residential Network, which provides a dedicated, switched, 10Mbps Ethernet connection for each student living in the residence halls and undergraduate apartments. ResNet costs are included in the housing fee, so there are no monthly connection or usage charges. To establish a network connection, your computer must meet specific minimum standards, and have an approved Network Interface Card (NIC). For more information about ResNet, call the CIS Help Desk at (603) 862-4242 or visit the Web site at www.unh.edu/cis/resnet.html

UNHINFO. UNH's campuswide information system functions as the starting point to search for and find any online University information such as: events, jobs, courses, directories, departments, and much more. UNHINFO is accessible to any computer with a network connection, including the student computing centers, dorms, and Internet service providers, at http://unhinfo.unh.edu

Disabilities, Services for Students

Students with physical, mental, or learning disabilities who need accommodations must register with the ACCESS Office (Accessing Career Challenges in Education through Specialized Services), Room 118, Memorial Union Building, (603) 862-2607 (Voice/TDD).

The University encourages members of the community with disabilities to use existing services and become involved in the mainstream of campus life. For information about priority scheduling, accessible classrooms, special parking arrangements, assistance in securing academic aides, accessible on-campus transportation, reading services, interpreters, academic modifications, and other special arrangements, contact the ACCESS Office.

Note: All bachelor of arts candidates must fulfill the University's foreign language requirement by their sophomore year (see page 20, Degree Requirements). A student with a documented disability who wishes accommodation on the basis that the disability will prevent him or her from successfully mastering a foreign language requirement, or whose foreign language requirement was waived in high school because of a documented disability, must contact the ACCESS Office, 118 Memorial Union Building, (603) 862-2607 (Voice/TDD).

International Students and Scholars

The Office of International Students and Scholars (OISS) promotes international education at UNH by facilitating the enrollment and employment of foreign nationals and by providing them with essential support services. The OISS coordinates programs which encourage interaction between the international, campus, and local communities, thereby fostering awareness and appreciation of other cultures. It is the responsibility of the OISS to ensure University compliance with U.S. immigration and employ-

ment regulations and to assist international students, exchange scholars, faculty, and staff in the achievement of their academic and professional goals.

The OISS staff provides counseling, information on University policies, administrative support, and referral services. A variety of social and educational programming activities are offered, including orientation for incoming students, faculty, and staff, and others designed to enhance student interaction with the broader community and provide opportunities for sharing in family events. For more information on programs and services, visit the OISS Web page at http://www.unh.edu/oiss. To schedule an appointment, call (603) 862-1508 or send e-mail to OISS@unh.edu.

All international students are encouraged to maintain contact with the OISS and are required by law to report changes of address, academic program, or source of educational funds.

Judicial Programs

The Judicial Programs Office is dedicated to preserving standards of conduct and is designed to be fair, to meet the requirements of due process, and to provide occasions for those involved to learn from their experiences.

Most violations of the Rules of Conduct are resolved in an informal manner. Those not resolved informally may be referred to a hearing board or judicial officer. Hearings are held to determine responsibility and appropriate sanctions, ranging from warnings to dismissal. If student misconduct results in the violation of both University regulations and criminal law, the student may face both the University student conduct system and criminal court proceedings. Staff members are available to answer questions relative to conduct issues or concerns and to provide advisement. More specific information can be found in the *Student Rights, Rules, and Responsibilities* publication. For more information, call the Judicial Programs Office at (603) 862-3377.

Multicultural Student Affairs

The mission of the Office of Multicultural Student Affairs (OMSA) at the University is twofold: (1) to provide services to African American, Latino, Asian American and Pacific Islanders, Native American, and gay, lesbian, bisexual, and transgendered students in order to increase their retention and graduation rates; (2) to support, promote, and assist students and student groups that contribute to making the University a diverse, multicultural community.

In pursuit of this vision and mission, the Office of Multicultural Student Affairs is dedicated to fostering the full participation of these student groups in all facets of the UNH community and assuring that they have equal and fair access to all academic, social, and recreational groups and activities.

In addition, OMSA serves as an umbrella organization and assists in planning efforts to promote diversity and pluralism in all facets of campus life. It acts as an advocate for students and as a University liaison to various student organizations and offices, such as the Diversity Support Coalition, Mosaico, Black Student Union (BSU), United Asian Coalition (UAC), Native American Cultural Association (NACA), the Alliance (gay, lesbian, bisexual, and transgendered student group), and Hillel (the Jewish student organization), among others.

OMSA is open to all students at the University. The office also assists the University in facilitating understanding, acceptance, and promotion of ethnic and racial diversity, integration, and intentional social interaction through both structured programs and various opportunities for productive dialog. For more information, call OMSA at (603) 862-2050.

Nontraditional Student Services

Since the 1970s, the nontraditional student population at the University of New Hampshire has been an active, hardworking group. These students remain dedicated to their education, their families, and to helping one another deal with issues and concerns often experienced by those having challenging lives apart from a university setting.

To assure that the University and its activities respond to the needs, desires, and lives of nontraditional students, a Nontraditional Student Advisory Board provides active support to this student population in concert with the Nontraditional Student Intern. The intern works to enhance communication among students by various publications and informs, advises, and generally supports nontraditional students during their time at UNH.

In addition, the Nontraditional Student Organization (NTSO) office, in the Memorial Union, offers programs and services and provides lounge space. Students are encouraged to stop by for information, to study in the lounge, or to visit with other students.

President's Commission on the Status of Women

The mission of the UNH President's Commission on the Status of Women is to create equal employment and educational opportunities for all UNH women by promoting an environment free of sexism and discrimination through policy, advocacy, and education. Established in February, 1972 to serve as a sister organization to the New Hampshire State Commission on the Status of Women, its functions include: collecting information on the status of women in the UNH community; recommending policies to the president and other University administrators; providing education and programs to help women develop their skills, increase networking among women, and inform the community of issues relating to the status of women; and reporting annually to the president on its activities and findings. Commission membership consists of a coordinator, chairperson, secretary, and volunteer representatives from University students, faculty, and staff. Candidates for membership are recommended by the commission and appointed by the UNH president. The commission is comprised of several standing and working committees, which are open to non-commission members. Located in Batcheller House, the commission also maintains an e-mail discussion list for those interested in its activities. Call (603) 862-1058, send e-mail to womens.commission@unh.edu, or visit the commission's Web page at http://www.unh.edu/womens-commission for more information.

President's Commission on the Status of People of Color

The UNH President's Commission on the Status of People of Color proposes, recommends, and evaluates programs, policies, and services aimed at enhancing diversity and supporting people of color within the UNH community. The commission acts to ensure implementation of goals to increase campus diversity through minority student, faculty, and

staff recruitment and retention, and through curriculum development. As an advocacy group, the commission identifies, recommends, and supports creative strategies for promoting and supporting campus diversity; it responds to issues, needs, and concerns identified within the community; it works to establish effective and collaborative working relationships between departments, offices, committees, commissions, and special programs that play a role in fostering diversity on campus and ensuring that the environment is supportive of the minority populations. The commission is located in Batcheller House on Rosemary Lane. The office is open Monday through Friday, 8:00 A.M. to 4:30 P.M., (603) 862-2338.

President's Task Force on Gay, Lesbian, Bisexual, and Transgender Issues

The UNH President's Task Force on Gay, Lesbian, Bisexual and Transgender Issues assists the president in monitoring the campus climate for gay, lesbian, bisexual, and transgender faculty, students, and staff. It reviews policies and programs that might affect the University's gay, lesbian, bisexual and transgender community and makes recommendations to the president on improving campus climate.

Established in 1992, the Task Force meets monthly during the academic year. Its membership includes gay, lesbian, bisexual, transgender, and straight University faculty, staff and students who are appointed by the president. Students from the gay, lesbian, bisexual, transgender, and ally community who are interested in participating on the Task Force are encouraged to contact the chair. Call (603) 862-0545, visit the task force's Web page at http://www.unh.edu/taskforce-glbt.

Police, University

The University Police Department, which is committed to the enforcement of laws and University policies supportive of the rights and dignity of all persons, seeks to maintain a campus environment in which learning may thrive. Officers, professionally trained in their respective areas, staff both the police and Security Services units.

Police department staff members participate in a number of programs for the UNH community including adopt-a-dorm and a women's self-defense program. The department also provides literature regarding crime prevention. On request, staff members will meet with groups to share precautions for increasing personal safety and protection of personal property. A walking patrol provides an escort service for students, faculty, and staff. Engraving pencils to inscribe identification numbers on property in case of theft are loaned free of charge to members of the campus community. To take advantage of any of these services, contact the University Police Department, (603) 862-1427.

Residential Life

Residential Life staff members focus on integrating students' learning outside of the classroom with traditional learning in the classroom. Staff members work with students, helping them to succeed academically, to get positively involved in the hall and University community, and to make friends. They accomplish this by providing students with social and educational opportunities, along with daily interaction.

The Residential Life staff includes a director, a team of thirty professional staff, and thirty resident assistants (RAs), who are a carefully-selected group of undergraduate and graduate students. Each residence hall is staffed with at least one full-time professional and several resident assistants.

The director of residential life also serves as the assistant vice president for student affairs. Consequently, all students receive special assistance from the Residential Life Office when seeking medical withdrawals or if they will be out of school for an extended period of time. In addition, Residential Life staff members often initiate responses to individual student emergencies. The assistant vice president also assumes co-responsibility for leadership development, establishing joint ventures with academic programs, orienting new students to the University, educational and social programming, and Greek Affairs.

Students are welcome to stop by the Residential Life Office, located in 13A Hitchcock Hall, or to call for more information at (603) 862-2268.

Sexual Harassment and Rape Prevention Program (SHARPP)

SHARPP is dedicated to providing a safe environment for all members of the University community. All services are free and confidential. SHARPP operates a twenty-four-hour crisis line to respond to the needs of survivors of sexual assault, intimate partner violence, sexual harassment, incest and childhood sexual assault. They also provide crisis services for allies: parents, friends, and family members close to the survivor. The crisis line is staffed at all times by two advocates who are trained in accordance with the New Hampshire state statute that protects confidential communication between the survivor and the advocate. Advocates will accompany survivors through the criminal justice system, internal judicial or affirmative action proceedings, police reporting process, and the medical system. SHARPP also offers several support groups as well as academic intervention. SHARPP provides campus-wide peer education programs and open forums for residential halls, Greek houses, athletic teams, and faculty, staff, and student organizations.

The SHARPP office is located at 202 Huddleston Hall. The office is open Monday through Friday, 8:00 A.M. until 4:30 P.M. The crisis and administrative line is (603) 862-3494. After hours, our crisis line is forwarded to UNH police dispatch. An advocate can be reached by dialing the crisis line followed by 0. When calling, only a first name and phone number are needed. The advocate will return the call immediately.

Sororities and Fraternities

Sororities and fraternities contribute to the community through social activities, leadership opportunities, and service programs. Advising is provided to the Greek System Panhellenic and Interfraternity Council and to individual houses in the coordination of their activities and adherence to student rights and rules.

Anyone interested in joining a fraternity or sorority may contact the Greek Affairs Office, located in the Memorial Union Building, by calling (603) 862-1002.

Student Affairs

The Division of Student Affairs is committed to preparing students to function

effectively in a pluralistic society. In conjunction with students and staff, faculty, and community members, the division works to create a university community which fosters learning and development; safeguards the rights of all individuals on campus; and expands understanding of different perspectives. The division encourages students to develop their interpersonal communication, critical thinking, and decision-making skills.

Student Affairs also fosters a special collaborative relationship that brings the Memorial Union, Residential Life, and Student Life together to increase opportunities for students. This effort joins the talents and skills of many staff members for leadership development programs, to forge important connections with academics, and to initiate programs assisting new students to make the transition to university life. In addition, civic responsibility and service learning and assesement efforts are enhanced through these shared resources as are social and educational programs.

The Office of the Vice President for Student Affairs provides leadership, management, and planning for the Division of Student Affairs departments and their programs and services. The office provides students with information, problem resolution, or referral. For more information or assistance, call the office at 862-2053.

Student Life Office

The Office of Student Life works to ensure a university environment that is conducive to learning and service and maintain standards of behavior appropriate to the campus community. The director of student life also serves as the assistant vice president for student affairs. Consequently, the office fulfills the role of student advocate and assists students with general concerns. Leadership is provided for the Partnership for Social Action, Sexual Harassement and Rape Prevention Program, Judicial Programs, the Student Activity Fee Organization, Campus Scan, and off-campus student outreach. Student Life also sponsors research and assessment projects and serves as liaison to the University Chaplains Association to foster a connection with the broader community.

More information on the Sexual Harassment and Rape Prevention Program (SHARPP) and Judicial Programs, important in upholding standards for the University community, is given on pages 12 and 13. Student Life oversees the Student Activity Fee Organization's business office in its accounting and financial advising for the SAF-funded organizations. At the end of each year, SAFO produces an annual report summarizing financial activities of each organization. Campus Scan brings together concerned community members to look at the campus climate affecting students. The Student Life Office also provides assessment and evaluation services to various programs throughout the Division of Student Affairs and conducts research that measures the outcomes of division-wide initiatives. The Partnership for Social Action Program provides students with opportunities to volunteer their time and talent locally toward a variety of human and environmental problems. The program connects students with nonprofit and governmental agencies for specific projects. Students may also work with local corporations in fundraising activities. Programs available to students include Alternative Spring Break Trips; visits to group homes for abused boys and girls; painting projects for the houses of low-income families; mentoring relationships between UNH students and teenagers; fund-raising events and tutoring projects between the University and area elementary schools. Staff members and student volunteers conduct outreach mini-sessions throughout campus. A listing of volunteer opportunities is maintained on the UNH campus information system, UNHINFO.

A student affairs assessment coordinator works to develop instruments and measurement strategies that provide information to the community about the effectiveness of the many programs sponsored by the Division of Student Affairs.

The Student Resource Center, a component of the Student Life Office, is located in Suite 122 of the Memorial Union Building. The office serves as a home base for off-campus students and provides information and referral as a means to inform and provide important connections for students in accessing academic and community services and support.

Veterans Information

The UNH veterans coordinator, located in the Registrar's Office 862-1595, provides counseling on all aspects of veterans' benefits as well as assistance in procuring and completing the required forms and certifications for veterans' benefits. The veterans coordinator maintains a comprehensive directory to assist veterans in contacting state, local, and University resources for housing, day care, career planning, employment, financial aid, tutorial assistance, remedial training, handicapped services, and Vietnam Veterans Outreach. The coordinator also provides a framework for networking among campus veterans.

Writing Center

The University Writing Center, 7 Hamilton Smith, provides individual help from trained consultants on all issues involving writing: subject choice, composing processes, genre, organization, structure, grammar and formal conventions, and ESL (English as a Second Language) issues. All these services are available without charge to any member of the University community. The Center offers consulting on writing issues to faculty, staff, and students. Students need not be enrolled in any specific course to use its services.

Although it is not an editing or proofreading service, UWC consultants will work with people who need help in learning to use grammar, punctuation, and writing conventions. The highly skilled staff works with undergraduates on papers and projects, with graduate students on their essays and theses, and with staff and faculty members on projects ranging from grant proposals to journal articles. The Writing Center operates on both a referral basis and a walk-in basis. Consultation services are available Monday through Thursday from 9:00 A.M. through 7:00 P.M., Friday from 9:00 A.M. through 4:00 P.M., Sunday nights from 5:00 P.M. through 9:00 P.M. For further information or to make an appointment, call (603) 862-3272.

Health Services

Medical Services

Health Services provides comprehensive primary medical care, laboratory testing, radiology, and pharmacy services. The staff maintains close relationships with outside specialists in the seacoast area to whom they may refer patients. Two

well-staffed and -equipped community hospitals are nearby, and emergency ambulance service is available in Durham at all times. For after-hours urgent care, Health Services has an agreement with one of the local hospitals to provide care for students.

During the regular academic year, Health Services is staffed by full-time, board-certified physicians, nurse practitioners, nurses, and medical assistants. Full-time registered nurses are certified in college health. Visits with physicians or nurse practitioners are by appointment. Students who have a medical problem requiring immediate attention will be assessed by a triage nurse who will determine if the student needs to see a practitioner at that time or can wait for a later appointment time.

Office of Health Education and Promotion

The Office of Health Education and Promotion (room 203, Health Services Center) presents educational workshops, offers support groups, and facilitates ongoing educational groups on a variety of physical and emotional health issues. Confidential assessment and referral are also available. The office offers nutritional counseling services, as well as anonymous and confidential HIV counseling and testing. A health educator/nurse provides education and support to students living with chronic illnesses. The resource room (room 249) contains information on physical and emotional health issues, including HIV/AIDS, alcohol/other drugs, men's and women's health issues, holistic health, wellness, stress management, sexuality, and eating concerns. These services and programs, reflect Health Services' commitment to assisting students in achieving optimal health and well-being. Appointments are made at the Office of Health Education and Promotion, or by calling (603) 862-3823.

Health and Counseling Fee

All undergraduate and graduate-degree candidates and all full-time nondegree candidates pay a mandatory health and counseling fee. The academic year 1997–1998 health and counseling fee was $389. Payment of the Health Services portion entitles the student to a variety of services, e.g., unlimited office visits; routine x-rays and laboratory procedures (when ordered by a Health Services practitioner); health education visits; many medications for treatment of acute illness and injuries and family planning services.

Health Insurance

A student health insurance policy has been available to students. However, at this writing, its status is under review. Please contact Health Services at (603) 862-1530 for current information.

Health Record Requirement

In order to provide effective care, Health Services requires that students who have been formally accepted for bachelor's or associate degree candidacy, and who register for five or more credits, must have medical records on file with Health Services. These records consist of (1) a health history to be completed by students before registration on a form provided by Health Services, (2) proof of immunity to measles, and (3) documentation of tuberculosis (TB) testing within one year prior to entrance to UNH. This is mandatory for registration. For measles, students must meet one of the following criteria: have received two live-virus measles vaccinations at least one month apart after 12 months of age, a positive measles titer (blood test), health provider documentation of measles, or have been born before 1957. International students must have been tested for TB within four weeks of arrival in the United States. Proof of date tested and test results must be submitted to Health Services. Students wishing exemption from Health Services' requirements on religious grounds must make a written request to the director of Health Services. It is the responsibility of students to complete the forms before the beginning of classes. Any student failing to complete these requirements may not be allowed to register for classes.

Fees and Expenses

The cost for the freshman year at the University averages about $14,178 for residents of New Hampshire and about $23,188 for nonresidents. See the folllowing chart for a breakdown of these costs.

Fees and Expenses (1998–1999)*

	In-state residents	Non-residents
Tuition	$5,140	$13,860
Fees		
Activity fee	75	75
Recreational fee	252	252
Memorial Union fee	227	227
Student athletic fee	472	472
Health and counseling fee	389	389
Subtotal of Required Expenses	$6,555	$15,275
Room and Board		
Double room	2,724	2,724
19 meals/wk.	1,912	1,912
Subtotal	$4,636	$4,636
Estimated Expenses (to cover books, supplies, transportation, misc.)	2,987	3,277
Total Estimate	$14,178	$23,188
Optional Fees		
Health Insurance	699	699
Parents Association Sponsorship	30	30

*The University reserves the right to adjust charges for such items as tuition, board, student fees, and room rent. Such changes will be announced as far in advance as feasible.

Tuition

Tuition in 1998–1999 was $5,140 ($13,860 for nonresidents) per academic year. Undergraduates registering for 12 credits or more per semester pay the full tuition.

Students are permitted to enroll for more than 20 credits only with the approval of their college or school dean. After midsemester, persons carrying more than 20 credits will be billed a per-credit fee of $214 for each credit above 20 for resident students and $578 for nonresident students, whether or not a student has obtained the dean's approval. (No refund will be made if a student subsequently drops a course, bringing the credits to 20 or fewer.) Resident undergraduates registering for fewer than 12 credits pay $214 per credit hour, plus a registration fee of $15 per semester. Nonresident undergraduates registering for fewer than 12 credits pay $578 per credit hour, plus a registration fee of $15 per semester. The minimum charge for any recorded course is $214 for residents and $578 for nonresidents.

Tuition differential charges apply to some majors. Students majoring in engineering (chemical, civil, electrical, mechanical) and computer science will be charged a tuition differential of $175 for both resident and nonresident students per academic year. Students in these programs (both resident and nonresident) who register for fewer than 12 credits pay a differential tuition of $5 per credit hour. Whittemore School majors are subject to a tuition differential surcharge of $300 for both resident and nonresident students per academic year.

All admitted students must pay an enrollment fee—$300 for residents and nonresidents. The enrollment fee, less $105 (to cover new student services such as orientation, preregistration, and record preparation), will be credited to the tuition bill. If a student decides not to attend the University, these payments may be refunded on a prorated basis until August 15, according to the guidelines set by the Office of Admissions.

Three-fourths of tuition charges will be refunded to students withdrawing or dropping courses within one week of the first day of classes; one-half after one week and within thirty days; and none thereafter (see the University Calendar). Students receiving federal financial aid will have their refund calculated in accordance with the U.S. Department of Education regulations in effect at the time of their withdrawal. A $100 administrative fee will be retained by the University. Specific details regarding the regulations are available in the UNH Financial Aid Office. Sample refund calculations are available at Business Services upon request. A degree candidate who withdraws from UNH and subsequently enrolls as a special student within the following year will be billed for tuition and fees on the same basis as degree candidates. Students with outstanding financial obligations to the University must clear their accounts before their registration will be confirmed.

A $25 fee must be paid by all students dropping courses after the third Friday of classes. The $25 fee will not be charged to persons changing to a reduced load or withdrawing; in both of these cases, the regular tuition rebate policy will apply. If a student has received permission to add a course after the third Friday of classes, a $25 fee will be assessed for each course added. A change of section within the same course is accomplished by a "drop" of one section and an "add" of another; however, only one $25 fee is assessed under these circumstances.

Fees

Required fees for 1998–1999 included a Memorial Union fee ($227) for the use and administration of the student union; a recreational fee ($252) for support of recreational facilities; a student activity fee ($75) for support of the undergraduate newspaper, yearbook, student government, student lawyer, student radio station, and other student organizations; a student athletic fee ($472) to provide support for athletic programs; and a health and counseling fee ($389) to provide general health care through University Health Services.

There are no waivers or refunds of these fees. The services and facilities are available to all—the extent to which each student uses them cannot be the factor by which assessment is determined.

Participants in intercollegiate athletics are required to purchase the student accident and sickness insurance or demonstrate proof of comparable insurance to the respective athletic department. The 1998–1999 cost for student accident and sickness insurance was $699 for a full calendar year.

A $30 contribution may be included to sponsor the Parents Association.

Mandatory Fees Include:

Recreation Fee

Use of indoor pool at the field house
Use of athletic facilities at the Whittemore Center, which includes:
- Aerobics
- Saunas
- Locker rooms

With an additional fee:
- CPR/First Aid course
- Ballroom dancing
- Lifeguard instruction

Health Services Fee

For information on health services see page 14.

Memorial Union Fee

For more information on the Memorial Union Building see page 9.

Athletic Fee

Admittance to all home games of organized sports at UNH
Financial support for athletes and athletic teams

Activity Fee

Support for the following organizations:
- The undergraduate newspaper
- Yearbook
- Student Government
- Student Lawyer
- Student radio station

Movies at reduced rates
Safe rides
Coast bus
For more information, check the *Get Involved* guide available at the Memorial Union Building.

Room and Board

Room and board charges average $4,636 per academic year for a double room with a 19-meal-per-week plan.

Students accepting a space on campus must include a $200 housing deposit with a signed Room and Board Agreement. Written notification of cancellation of the room application or assignment received before August 15 will result in forfeiture of the deposit only. Written notification of cancellation after August 15 and before Friday of the first week of class will result in a charge of one-fourth of the full semester's housing fee.

If the student fails to occupy the assigned room by Friday of the first week of class or cancels the agreement by mutual consent, or if for disciplinary or nonrenewal actions the agreement is canceled, the student will receive a 75 percent refund of the semester's housing fee. Cancellation after the first Friday of classes and before thirty days after registration will result in a 50 percent refund of the semester's housing fee. Cancellation thirty days after registration will result in no refund of the housing fee. Students who check in or move in to a hall or apartment, move out, and do not withdraw from the University are charged the full housing fee. If the agreement is canceled, the total amount of the housing deposit will be applied against any unpaid University charges.

Refunds on board plans will be granted only on approved waivers or withdrawal from the University. Cancellation of a meal plan before semester opening will result in a 100 percent refund; after semester opening but before the end of the first week of the semester, 75 percent refund; and after the end of the first week but before the end of the fourth week, 50 percent refund. Refunds after the fourth week through the end of the twelfth week will be based on the re-

maining food cost portion of the meal plan. No refunds will be made after the end of the twelfth week. Generally, rebates will not be allowed for missed meals except in the case of illness.

Rebates

Any amount owed to the University will be deducted from any rebate due to a student.

Deposits and Course Fees

Refundable deposits may be required to cover locker keys or loss or breakage in certain departments. A charge will be made for individual lessons in music, as noted in the description of applied music courses. A charge will be made for riding lessons and scuba, as noted in the sections on animal sciences and physical education. Some courses carry special fees to cover the costs of special equipment, field trips, etc.; these are noted in the course descriptions. Thompson School students pay curriculum fees to cover special costs in their programs (see the Thompson School catalog). Students will be charged a computer use fee for courses requiring computer access and/or common access accounts. For certain courses, there are also lab fees.

Other Expenses

Books and classroom supplies cost approximately $700 annually. These may be purchased at the University Bookstore.

Personal expenses vary considerably with individual students and include clothing, laundry, recreation, incidentals, and travel.

Payment

All bills, including those for room and board in University buildings, are due and payable in full on the payment due date for each semester. A late payment fee will be assessed to all accounts unpaid by the payment due date set for each semester.

University bills remaining unpaid more than 90 days after termination of student status for any reason may be placed for collection. In that event, the debtor will be liable for collection costs.

Parents and students who wish to make periodic payments should consult their local banks, other financial institutions, or the University's Business Services Office for assistance in locating firms that provide programs for budgeting educational expenses.

University Academic Requirements

To graduate from the University of New Hampshire, students must fulfill four types of University requirements: writing, general education, degree, and major.

University Writing Requirement

As the cornerstone of any higher education, academic and disciplinary literacy is the concern of the entire faculty and the whole University curriculum. Understanding that literacy is a long-term development process, the University community is committed to the following goals for student writing and learning:

a. Students should use writing as an intellectual process to learn material, to discover, construct, and order meaning.

b. Students should learn to write effectively in various academic and disciplinary genres for professional and lay audiences.

c. Students should learn to display competence with the generic features and conventions of academic language.

Writing-Intensive Courses

All undergraduates admitted as new freshmen or as transfers with freshman or sophomore class standing for September 1999 or January 2000 will be required to complete four "writing-intensive" courses, which must include English 401 (Freshman Composition) and three additional "writing-intensive" courses, one of which must be in the student's major, and one of which must be at the 600-level or above. Specific courses that fulfill the writing requirement are listed below. Any course appearing in this list will fulfill one of the writing requirements if taken after August 29, 1999.

All courses that are currently approved as writing intensive appear on this list. Additional courses may be added. **Visit our Web site at http://unhinfo.unh.edu/registrar/registration.html for the most up-to-date list.** Some courses have both writing intensive and non-writing intensive versions, such as ANSC 400 and ANSC 400W. In those cases, only the sections attached to the "W" courses will be writing intensive.

Please note that some cross-listed courses are also writing intensive. For the most current information on cross-listed courses, visit the Web site listed above.

AMST 502, 608, 609, 610
ANSC 400W, 405, 602, 714, 720, 750W
ANTH 411H, 411W, 500W, 517, 614, 630
AOE 650, 702
ARTS 431, 431H, 480, 487, 574, 580, 581, 608, 610, 654, 655, 656, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 697, 699, 795, 799
BCHM 755, 760, 765
CHE 612, 612E, 613, 613E
CHEM 686W, 699, 756W, 763W, 775W
CIE 505, 622, 642, 788
CLAS 401H, 421, 422, 500, 503, 504, 521, 522
CMN 602, 607, 615, 630, 632, 638, 640, 656, 657, 658, 680, 696, 698, 701, 772
COMM 523
CS 719, 735, 760, 770
‡ECN 411W, 412W
ECON 402H, 615, 668, 669, 698, 711, 736
EE 401, 617, 618, 790
ENCV 520, 556, 643, 645, 742, 746
ENGL 400, 401, 401A, 401H, 403, 500, 501, 501H, 503, 511, 513, 514, 514H, 515, 515H, 516, 516H, 517, 518, 519, 519H, 520, 521, 522, 523, 525, 529, 529H, 533, 581, 581H, 585, 586, 595, 607, 608, 609, 610, 616A, 616B, 616C, 616D, 619, 621, 623, 625, 626, 627, 628, 630, 631, 632, 649, 650, 651, 652, 655, 657, 657H, 681, 685, 690, 693, 694, 695, 696, 697, 698, 701, 703, 704, 705, 707, 708, 709, 710, 711, 713, 714, 715, 716, 718, 720, 721, 722, 725, 726, 732, 739, 741, 742, 743, 745, 746, 747, 748, 749, 750, 751, 752, 754, 755, 756, 758, 759, 763, 764, 765, 767, 768, 769, 770, 771, 773, 774, 778, 780, 781, 782, 783, 784, 785, 786, 790, 791, 792, 794, 795, 797, 798
EREC 704, 708, 715, 756
ESCI 530, 726, 734, 759
ET 733
FOR 506
FREN 425, 500, 503, 503H, 504, 504H, 521, 525, 526, 631, 632, 651, 651H, 652, 652H, 675, 676, 677, 762, 765, 775, 782, 785, 790
FS 697, 743, 797
GEOG 541, 581, 582
GERM 500, 640, 645, 645H, 724, 724H, 727, 728, 728H
GERO 600
HHS 510
HIST 406W, 410, 410H, 425W, 425H, 436W, 483, 484, 497W, 500, 506, 532, 540, 576, 577, 608, 622, 797
HMGT 401, 403, 600, 635, 703
HMP 401W, 744
HP 540W
HUMA 401, 411, 412, 480, 500, 510A, 510B, 510C, 510D, 511A, 511B, 511C, 511D, 512A, 512B, 512C, 512D, 513A, 513B, 513C, 513D, 607, 608, 609, 610, 650, 651, 700, 730, 798, 799
IA 401, 501, 701
INCO 404B, 404C, 404D, 404E, 404F, 404G, 404H, 404J, 404K, 404L, 404M, 404N, 404O, 404P, 404R, 404S, 404T, 404U, 404W, 404Y, 604H, 605H
‡INTR 439, 732
ITAL 425, 500, 503, 504, 521, 522, 631, 651, 652
KIN 550, 561, 621, 658, 671, 681, 761, 786
LING 790, 794
MATH 531, 545
ME 441, 503, 525, 526, 561, 608, 627, 643, 646, 670, 705, 747, 755, 756,777
MICR 707, 717, 718
MLS 602, 610
MUSI 609, 703, 705, 707, 709, 711
NR 602, 713, 753, 775
NURS 501, 535, 619
NUTR 405, 646, 720, 750W, 780
OT 511, 514
PBIO 655, 719, 726
PHIL 401W, 421, 436W, 500, 510, 600, 616, 618, 620, 630, 635, 660, 683, 699, 701, 702, 710, 720, 725, 735, 745, 750, 755, 780, 795, 796, 798, 799
PHYS 705
POLT 500, 502, 507, 510, 512, 513, 523, 544, 545, 546, 547, 550, 551, 552, 554, 556, 557, 558, 562, 566, 567, 568, 569, 571, 595, 596, 600, 620, 651, 660, 701, 702, 703, 704, 743, 744, 747, 760, 761, 762, 778, 795, 796, 797, 798, 799
PORT 500
PSYC 502, 704, 710, 711, 712, 713, 713H, 721, 731, 732, 732H, 733, 741, 752, 752H, 755, 755H, 762, 770, 771, 780, 783, 785, 791, 791A, 791B
RMP 600, 724
RS 483, 484, 576, 577, 607
RUSS 500, 521, 522, 593, 691
SOC 400H, 400W, 500W, 530W, 540W, 599W, 611W, 612W, 635W, 645W, 660W, 665W, 697
SOIL 705
SPAN 500, 650
SW 525, 622, 623, 640A, 641A
TECH 797
THDA 436, 436H, 438, 438H, 653, 653A, 654, 655, 795, 796
TOUR 400, 767
WILD 636, 738
WLCE 425F, 425I, 500, 521F, 521I, 521R, 522I, 522R, 525F, 526F, 593R
WS 401, 401H
ZOOL 629, 712, 713

‡UNHM courses

General Education Program

The general education program is designed to emphasize the acquisition and improvement of those fundamental skills essential to advanced college work, especially the abilities to think critically, to read with discernment, to write effectively, and to understand quantitative data. It aims to acquaint the student with some of the major modes of thought necessary to understanding oneself, others, and the environment. It seeks to develop a critical appreciation of both the value and the limitations of significant methods of inquiry and analysis. Its goal, moreover, is the student's achievement of at least the minimal level of literacy in mathematics, in science and technology, in historical perspectives and the comprehension of our own and other cultures, in aesthetic sensibility, and in the diverse approaches of the humanities and the social sciences to understanding the human condition.

General education is intended to serve as a foundation for any major. It aims to go beyond the mastery of job-related skills and educate students so that they learn how to learn. The program is based on the premise that change is the dominant characteristic of our times and that the truly useful education stresses intellectual adaptability and the development of those problem-solving abilities, cognitive skills, and learning techniques vital to lifelong learning.

General Education Requirements

Students must fulfill the following general education requirements:

1. one course in writing skills, which must be taken during a student's first year. This course will satisfy the English 401/Freshman Composition component of the Writing Requirement;
2. one course in quantitative reasoning, which must be taken during a student's first year;
3. three courses in biological science, physical science, or technology, with no more than two courses in any one area;
4. one course in historical perspectives;
5. one course in foreign culture (may also be satisfied by approved study abroad programs);
6. one course in fine arts;
7. one course in social science; and
8. one course in works of philosophy, literature, and ideas.

General education requirements shall not be waived on the basis of special examinations or placement tests, except for the College Board Advanced Placement tests and the College Level Examination Program (CLEP) tests. The required courses cannot be taken on a pass/fail basis. No single course may be counted in more than one general education category. Academic departments may or may not permit general education courses to count toward requirements for a major. Each course must carry at least 3 credits to qualify for general education consideration.

The specific courses that fulfill each category of the general education requirements are printed below. Any course appearing in this list will fulfill a general education requirement if taken after August 29, 1999.

1. Writing Skills

ENGL 401

2. Quantitative Reasoning

ADM 430‡
BIOL 528
CS 410, 411, 505
DS 420
EREC 525
HHS 540
INCO 404B*
MATH 419, 420, 424, 425
PHIL 412, 550
PSYC 402
SOC 502

3. Biological Science, Physical Science, and Technology

Biological Science
ANSC 400, 401
BIOL 405‡, 406‡, 411, 412, 413‡, 414‡
HMP 501
INCO 404C*
KIN 527, 607
MICR 500, 501
NR 410, 412
PBIO 400, 412, 421
WILD 433
ZOOL 402, 412, 474, 507, 508
Physical Science
CHEM 401, 402, 403, 404, 405, 409
EOS 405
ESCI 401, 402, 405, 409, 450, 501
GEOG 473
INCO 404D*
PHYS 401, 402, 406, 407, 408
WARM 504
Technology
CIS 411‡, 515‡
CS 401, 403
EC 535
ENCV 520
FOR 502
INCO 404E*
PHIL 447, 450
TECH 583

4. Historical Perspectives

ENGL 515
HMP 510
HIST 405, 406, 410, 421, 422, 435, 436, 483, 497, 505, 506, 511, 521, 522, 523, 531, 532
HUMA 510C†, 511C†, 512C†, 513C†, 515C
INCO 404F*, 404G*
KIN 561
POLT 403, 508
RS 483

5. Foreign Culture

ANTH 411, 500, 512, 515, 519
CHIN 503, 504
ENGL 581
FREN 425, 503, 504, 525, 526
GEOG 401, 402, 541
GERM 503, 504, 523, 524, 525
GREK 503, 504
HIST 425, 563
INCO 404H*, 404J*, 404K*
INTR 438‡
ITAL 425, 503, 504
JPN 425, 503, 504
LATN 503, 504
POLT 553, 555, 556, 557, 559
PORT 503, 504
RUSS 425, 502, 503, 504
SPAN 503, 504, 525, 526
WLCE 425F, 425I, 425R, 523G, 524G, 525F, 525G, 525S, 526F, 526S

6. Fine Arts

ARTS 431, 480, 487, 532, 570, 571, 572, 573, 574, 580, 581
HUMA 480A**, 510A†, 511A†, 512A†, 513A†, 515A†

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* Available only to honors program students and others who have obtained special permission.

** Students may take either HUMA 480A or 480B but not both

† For students who complete the entire sequence of HUMA 510, 511, 512, and 513, enrolling in different discussion sections each time, a fifth general education requirement (in foreign culture) will be waived, although additional credit hours will not be granted.

‡ Offered only at UNHM (Manchester).

INCO 404L*, 404M*, 404N*, 480
MUSI 401, 402, 501, 502, 511, 512
PHIL 421
THDA 435, 436, 438, 441, 450, 459, 461, 462, 463, 487, 546, 548, 551, 555, 583, 624

7. Social Science

ANSC 405
ANTH 412, 518, 625
CD 415
CLAS 506
CMN 402, 455, 457
ECN 411‡, 412‡
ECON 401, 402
ENGL 505
EREC 411
FS 525
GEOG 581, 582
GERO 600
HHS 510
HMP 401
HUMA 510D†, 511D†, 512D†, 513D†, 515D†
INCO 401, 402, 404O*, 404P*, 404R*, 404S*
KIN 560
LING 505, 506
NURS 535, 670
NUTR 405
POLT 402, 504, 505, 560, 564, 565, 566, 567
PSYC 401
RMP 550, 570
SW 525
SOC 400, 500, 520, 530, 540, 625
WS 401

8. Works of Literature, Philosophy, and Ideas

AMST 501, 502
CLAS 401, 402, 421, 422, 500
CMN 456
ENGL 511, 513, 514, 516, 517, 518, 519, 521, 522, 523, 533, 585, 586, 630, 631, 632, 651, 657, 681, 685
FREN 500, 521, 651, 652
GERM 500, 520, 521
HIST 484
HUMA 401, 480B**, 500, 501, 502, 503, 510B†, 511B†, 512B†, 513B†, 515B†, 519‡, 520† , 650, 651
INCO 404T*, 404U*, 404W*, 404Y*, 450
ITAL 500, 521, 522, 651, 652
PHIL 401, 417, 424, 430, 435, 436, 520, 525, 540, 570, 574, 600, 630, 660
POLT 401, 407, 520, 521, 522, 523, 524
PORT 500
PSYC 571
RS 484
RUSS 500, 521, 522, 593
SPAN 500, 521, 522, 650, 651, 652, 653, 654
WLCE 500, 520G, 521F, 521G, 521I, 521R, 521S, 522R, 522S, 593R

Degree Requirements

Requirements in this catalog apply to students who enter the University between July 1, 1999, and June 30, 2000. (Students who entered the University at an earlier time but who wish to change to the requirements of this catalog must apply to the appropriate office for the change.) Students will be held responsible for all work required for graduation and for the scheduling of all necessary courses. Students are each provided one free copy of the catalog that is in effect at the time of their entry to the University. They are expected to keep that copy for the duration of their time at the University. Any other copies must be purchased, and availability cannot be guaranteed.

Modifications tend to occur in major programs during the four-year period of students' undergraduate careers. Students are expected to conform to these changes insofar as they do not represent substantive alterations in their course of study.

Note: Although the University will try to provide sufficient facilities so that students may pursue any major or curriculum for which they meet the requirements, such a privilege cannot be guaranteed, since rapidly increasing enrollment sometimes results in the overcrowding of required specialized courses. On occasion, students may remain in a crowded curriculum if they are willing to take certain courses during the summer session.

Bachelor of Arts

1. At least 128 credits in courses numbered 400-799, with a cumulative grade-point average of 2.00 for all courses taken at the University in which a grade is given.

2. Completion of the University general education requirements.

3. Proficiency in a foreign language at the level achieved by satisfactory work in a one-year, college-level course. This requirement may be fulfilled by taking a College Board foreign language achievement test, or by completing a full-year elementary course in any foreign language, or by completing a semester of a course in a foreign language beyond the elementary year, or by completing a one-year college-level course in American Sign Language (must be 8 UNH credits or equivalent). This requirement must be satisfied by the end of the sophomore year.

Note: A student with a documented disability who wishes accommodation on the basis that the disability will prevent him or her from successfully mastering a foreign language requirement, or whose foreign language requirement was waived in high school because of a documented disability, must contact the ACCESS Office, 118 Memorial Union Building, (603) 862-2607 (Voice/TDD).

Bachelor of Fine Arts, Bachelor of Music

Requirements for the B.F.A. degree are on page 32; for the B.M. degree, on page 42.

Bachelor of Science

1. At least 128 credits in courses numbered 400-799, with a cumulative grade-point average of 2.00 for all courses taken at the University in which a grade is given.

2. Completion of the University general education requirements.

3. For specific requirements, check individual departmental or program listings. See also pages 50, 67, 78, 94, and 112.

Associate in Arts

1. Completion of at least 64 credits with a minimum grade-point average of 2.00.

2. Completion of two "writing intensive courses," one of which must be ENGL 401, Freshman Composition.

3. Completion of general education requirements as follows (no pass/fail allowed):

a. one course in writing skills. This course will satisfy the ENGL 401, Freshman Composition, component of the writing requirement.
b. one course in quantitative reasoning
c. one course in the biological sciences, or physical sciences, or technology
d. three courses chosen from the following, with no more than one from each category: historical perspectives; foreign culture; fine arts; social science; works of philosophy, literature, and ideas

The Division of Continuing Education may prescribe up to four of the six required courses used to satisfy the general education requirements. A list of courses that may be used to meet these requirements will be available from an adviser.

4. A minimum of four courses freely selected by the student.

5. The remaining courses or credits may be earned in one of the career concentrations described on page 114 and/or in elective general education courses.

6. The last 16 credits must be University of New Hampshire courses completed at UNH following admission and matriculation, unless permission is granted to transfer part of this work from another institution.

Dual Degrees

The opportunity to pursue simultaneously two undergraduate degrees enhances and broadens the education of certain students. The program is only for those students who can adequately handle the requirements for two different degrees and who can reasonably allocate the additional time and effort needed for the program. Except for specific five-year degree programs (page 24), a student may not pursue two different degree levels simultaneously.

Requirements

1. Students desiring dual degrees must petition the college dean or deans involved for permission.

2. Students must have a minimum 2.5 cumulative grade-point average.

3. Students planning to take one degree in a highly prescribed curriculum should register as freshmen in the appropriate school or college for that curriculum.

4. It is expected that candidates for two degrees will complete 32 credits beyond those required for the first degree.

5. Students can earn more than one bachelor of science (B.S.) degree, provided that each degree is in a different field. Students cannot earn more than one bachelor of arts (B.A.) degree.

6. Transfer students already holding a baccalaureate degree from another accredited institution may pursue an additional baccalaureate degree at the University of New Hampshire provided they fulfill the previously listed requirements. The degree received at the first institution will be accepted by UNH as awarded by that institution.

Supervision

As soon as a student is accepted as a candidate for two degrees, the appropriate dean(s) will appoint supervisors for each of the proposed majors. The supervisors and the student will work out a basic course plan for the two degrees and inform the appropriate dual degree dean(s) of the plan. The supervisors will maintain joint control over the student's academic program. The college offices and the supervisors will receive copies of grade reports and other records for students pursuing two degrees.

Minimum Graduation Average

A cumulative grade-point average of 2.00 in University of New Hampshire courses is the minimum acceptable level for undergraduate work in the University and for graduation. In addition, some majors require a grade-point average greater than 2.00 in certain courses or combinations of courses. The Academic Standards and Advising Committee examines the records of students periodically and may place academically deficient or potentially deficient students on warning, or may exclude, suspend, or dismiss those who are academically deficient.

Quota of Semester Credits

Students registering for more than 20 credits must receive the approval of the college dean.

Undergraduates are assigned class standing on the basis of semester credits of academic work completed with a passing grade, as follows: to be a sophomore—26 credits; to be a junior—58 credits; to be a senior—90 credits.

Residence

"Residence" means being enrolled in University of New Hampshire (including UNH at Manchester) courses after admission to and matriculation in a degree program. Students who are candidates for a bachelor's degree must attain the last one-quarter of total credits for the degree in residence unless granted permission by the Academic Standards and Advising Committee to transfer part of this work from other accredited institutions.

Leave of Absence or Withdrawal from the University

Students who leave the University are required to file formal notification with the registrar.

Majors, Minors, and Options

Majors and some interdisciplinary minors are described under their various schools and colleges; other interdisciplinary and intercollege minors are described in the section on Special University Programs.

Student-Designed Majors

See page 103 for requirements for a student-designed major.

Second Majors

Bachelor's degree students may choose to fulfill the requirements of two dissimilar major programs, provided they obtain the approval of their principal adviser and the dean(s) of the college(s) in which the programs are offered, and comply as follows:

1. If the two majors are offered in different schools or colleges within the University, the admissions requirements of each must be satisfied.

2. If the two majors have two distinct degrees, e.g., B.A., B.S., or some other designated degree, students must choose which of the two degrees is to be awarded and fulfill all requirements for that degree.

3. No more than 8 credits used to satisfy requirements for one major may be used as requirements for the other major.

Minors

Students may earn a minor in any undergraduate discipline designated by the University. A list of minors is available from the advising coordinator in each college or school (or see the program descriptions for each college or school in this catalog). Students must consult with their major adviser and also the minor supervisor. A minor typically consists of 20 credits with C– or better and a 2.00 grade-point average in courses that the minor department approves. Courses taken on the pass/fail basis may not be used for a minor. No more than 8 cred-

its used to satisfy major requirements may be used for the minor. Students should declare an intent to earn a minor as early as possible and no later than the end of the junior year. During the final term, an application should be made to the dean to have the minor shown on the academic record.

Options

Some degree programs offer a selection of options (e.g., art history and art studio through the Department of the Arts). These areas of concentration allow students to specialize within a discipline. The choice of option is recorded on the student's transcript.

Grades

Grading and honors policies as stated in this catalog apply to all undergraduate students.

Instructors assign grades as listed below; grade points per credit are indicated in parentheses. For all undergraduate courses, grading standards established by the Academic Senate are that a C indicates competent, acceptable performance and learning; B indicates superior performance and learning; and A indicates excellent performance and learning. These standards apply to all undergraduate courses, instructors, departments, subjects, and colleges. The University reserves the right to modify grading and honors practices.

A	(4.00)	Excellent
A–	(3.67)	Intermediate grade
B+	(3.33)	Intermediate grade
B	(3.00)	Superior
B–	(2.67)	Intermediate grade
C+	(2.33)	Intermediate grade
C	(2.00)	Satisfactory, competent
C–	(1.67)	Intermediate grade
D+	(1.33)	Intermediate grade
D	(1.00)	Marginal grade
D–	(0.67)	Intermediate grade
F	(0.00)	Failure: academic performance so deficient in quality as to be unacceptable for credit
AF	(0.00)	Administrative F (usually indicates student stopped attending without dropping the course); is included in grade-point average
CR		Credit: given in specific courses having no letter grades, designated credit/fail
P		Passing grade in a course taken under the student pass/fail grading alternative
W		Withdrawal—assigned if withdrawal is later than fifth Friday of classes (but not after midsemester); is not included in grade-point average
WP		Withdrawal—assigned if withdrawal is after midsemester and if student is passing; is not included in grade-point average
WF		Withdrawal—assigned if withdrawal is after midsemester and if student is failing; is included in grade-point average
AU		Audit—no credit earned
IC		Grade report notation for student's incomplete coursework
IA		Indicates "incomplete" in a thesis or continuing course of more than one semester; the grade earned will replace "IA" assigned in previous semesters
IX		Grade not reported by instructor

Students earning a semester or cumulative grade-point average less than 2.00 are placed on "academic warning."

Pass/Fail

While earning a bachelor's degree, students may choose the pass/fail grading alternative for a maximum of 4 credits per semester up to a total of 16 credits toward the degree.

Pass/fail cannot be used for general education requirements, for courses required by a student's major or second major, for option or minor requirements, for ENGL 401, or for repeated courses. In addition, B.A., B.F.A., and B.M. degree candidates may not use pass/fail for courses taken to meet the foreign language requirement, and no Whittemore School course may be taken on a pass/fail basis by a student majoring in administration, economics, or hospitality management.

The minimum passing grade for credit is a D– (0.67); any grade below this minimum is a fail. All grades will be recorded on the grade roster as A, B, C, D, F, or intermediate grades. The pass/fail marks will be placed on students' transcripts and grade reports by the Registrar's Office. The course will not be included in the grade-point calculation, but the pass or fail will be recorded, and in the case of a pass, the course credits will be counted toward degree requirements.

Associate in arts students, see page 20.

Honors

An undergraduate degree student, after completion of at least 12 graded credits in University of New Hampshire courses, is designated as an honor student for a given semester if the student has (a) completed at least 12 graded credits for that semester and earned at least a 3.20 semester grade-point average; or (b) earned at least a 3.20 cumulative grade-point average and at least a 3.20 semester grade-point average regardless of the number of graded credits that semester. These categories are used: 3.20 to 3.49 (honors); 3.50 to 3.69 (high honors); and 3.70 to 4.00 (highest honors).

Bachelor's degree candidates who have earned honors for their entire work at the University will be graduated with honors based on the final cumulative grade-point average, provided that a minimum of 64 graded credits have been completed in University of New Hampshire courses. The Latin equivalent of the honors classification will appear on the student's academic record and diploma. The student's honors classification will be noted in the commencement program.

Academic Honesty

Academic honesty is a core value at the University of New Hampshire. The members of its academic community both require and expect one another to conduct themselves with integrity. This means that each member will adhere to the principles and rules of the University and pursue academic work in a straightforward and truthful manner, free from deception or fraud. The academic policy can be found in the annual publication, *Student Rights, Rules, and Responsibilities.*

Degrees and Major Programs of Study

College of Liberal Arts

The teacher education division of the College of Liberal Arts coordinates the five-year undergraduate/graduate teacher education program. See page 34.

Bachelor of Arts
Anthropology
The Arts
  Art History
  Art Studio
Classics
Communication
English
English/Journalism
English Teaching
French
French Studies
Geography
German
Greek
History
Humanities
Latin
Linguistics
Music
  Music History
  Music Theory
  Performance Study
  Preteaching
Philosophy
Political Science
Psychology
Russian
Sociology
Spanish
Theatre
Women's Studies

Bachelor of Fine Arts
Fine Arts

Bachelor of Music
Music Education
Organ
Piano
Strings, Woodwinds, Brass, or Percussion
Theory
Voice

College of Life Sciences and Agriculture

Bachelor of Arts
Plant Biology
Zoology

Bachelor of Science
Adult and Occupational Education
Animal Sciences
  Bioscience and Technology
  Equine Sciences
  Preveterinary Medicine
Biochemistry
Biology
  Ecology and Evolutionary Biology
  General Biology
  Marine and Freshwater Biology
  Molecular, Cellular, and Developmental Biology
Community Development
Dairy Management
Environmental and Resource Economics
Environmental Conservation
  Environmental Affairs
  Environmental Science
Environmental Horticulture
General Studies
Microbiology
Nutritional Sciences
Plant Biology
Soil Science
Tourism Planning and Development
Water Resources Management
Wildlife Management
Zoology

Bachelor of Science in Forestry
Forestry
  Forest Management
  Forest Science

College of Engineering and Physical Sciences

Bachelor of Arts
Chemistry
Chemistry and Physics Teaching
Earth Science Teaching
Earth Sciences
Mathematics
Physics
  Biophysics

Bachelor of Science
Chemical Engineering*
  Energy
  Environmental Engineering
Chemistry*
Civil Engineering*
Computer Science*
Electrical Engineering*
  Computer Engineering
  Signals and Systems
Electrical Engineering Technology*
Environmental Engineering* (Pending Trustee Approval)
  Chemical Engineering
  Civil Engineering
Geology*
Hydrology*
Interdisciplinary Mathematics
  Computer Science
  Economics
  Electrical Science
  Physics
  Statistics
Mathematics*
Mathematics Education*
  Elementary
  Middle/Junior High
  Secondary
Mechanical Engineering*
Mechanical Engineering Technology*
Physics*
  Applied Physics Optics
  Biophysics
  Chemical
  Environmental Radiation
  Materials Science

School of Health and Human Services

Bachelor of Arts
Social Work

Bachelor of Science
Communication Disorders
Family Studies
  Child and Family Studies
Health Management and Policy
Kinesiology
  Athletic Training
  Exercise Science
  Outdoor Education
  Physical Education Pedagogy
  Sport Studies
Medical Laboratory Science
  Clinical Chemistry
  Clinical Hematology
  Clinical Immunohematology
  Clinical Microbiology
Nursing
Occupational Therapy
Recreation Management and Policy
  Program Administration
  Therapeutic Recreation

* Designated degree (the name of the specialization is included on the diploma; e.g., B.S. in Chemistry).

Whittemore School of Business and Economics

Bachelor of Arts
Economics
- Financial and Managerial Economics
- International and Development Economics
- Public Policy Economics

Bachelor of Science
Business Administration
Hospitality Management

Thompson School of Applied Science, of the College of Life Sciences and Agriculture

Associate in Applied Science
Applied Animal Science
Applied Business Management
Civil Technology
Food Services Management
Forest Technology
Horticultural Technology

University of New Hampshire at Manchester

Associate in Arts
General Studies
Studio Arts

Associate in Science
Biological Sciences
Business Administration

Bachelor of Arts
Communication
English
History
Humanities
Political Science
Psychology

Bachelor of Science
Business Administration
Electrical Engineering Technology*
Mechanical Engineering Technology*
Nursing
Sign Language Interpretation

Division of Continuing Education

Associate in Arts
Career Concentrations
- Computer/Information Systems Applications
- Pre-Engineering and Physical Sciences

Five-Year Degree Programs

Bachelor of Arts and Master of Business Administration
Bachelor of Science and Master of Business Administration
Bachelor of Arts and Master of Education
Bachelor of Science and Master of Education
Bachelor of Science and Master of Science in Accounting

Interdisciplinary Majors

Bachelor of Arts
International Affairs

Interdisciplinary Minors

African American Studies
Agribusiness
American Studies
Asian Studies
Community Planning
Environmental Engineering
Genetics
Gerontology
Health Promotion
History and Philosophy of Science
Humanities
Hydrology
Justice Studies
Latin American Studies
Marine Biology
Materials Science
Ocean Engineering
Oceanography
Plant Pest Management
Race, Culture, and Power
Religious Studies
Russian Studies
Sustainable Living
Technology, Society, and Values
War and Peace Studies
Wetland Ecology
Women's Studies

Advisory Committees

Prelaw
Premedical/Prehealth Care Professional

Graduate School

Master of Arts
Master of Science
Master of Arts in Liberal Studies
Master of Arts in Teaching
Master of Business Administration
Master of Education
Master of Health Administration
Master of Adult and Occupational Education
Master of Public Administration
Master of Science for Teachers
Master of Social Work
Certificate of Advanced Graduate Study
Doctor of Philosophy

Program Abbreviations

The following abbreviations are used to identify undergraduate and graduate courses offered at the University. An asterisk (*) preceding the letters identifies those disciplines offering graduate-level coursework.

College of Liberal Arts

ANTH	Anthropology
ARTS	Art and Art History
CHIN	Chinese
CLAS	Classics
CMN	Communication
* EDUC	Education
* ENGL	English
FREN	French
GEOG	Geography
GERM	German
GREK	Greek
* HIST	History
HUMA	Humanities
ITAL	Italian
JPN	Japanese
LATN	Latin
LING	Linguistics
* MUSI	Music
* MUED	Music Education
PHIL	Philosophy
* POLT	Political Science
PORT	Portuguese
* PSYC	Psychology
RS	Religious Studies
RUSS	Russian
SCSC	Social Science
* SOC	Sociology
* SPAN	Spanish
THDA	Theatre and Dance
WS	Women's Studies
WLCE	World Literatures and Cultures in English

College of Engineering and Physical Sciences

* CHE	Chemical Engineering
* CHEM	Chemistry
* CIE	Civil Engineering
* CS	Computer Science
* ESCI	Earth Sciences
* EE	Electrical and Computer Engineering
* ENGR	Engineering
ET	Engineering Technology
ENCV	Environmental Engineering: Civil Engineering
* MATH	Mathematics
* ME	Mechanical Engineering
* OE	Ocean Engineering
* PHYS	Physics
TECH	Technology (nondepartmental)

School of Health and Human Services

* COMM	Communication Disorders
* FS	Family Studies
HHS	Health and Human Services
* HMP	Health Management and Policy
HP	Health Promotion
* KIN	Kinesiology
MLS	Medical Laboratory Science
* NURS	Nursing
* OT	Occupational Therapy
RMP	Recreation Management and Policy
* SW	Social Work

College of Life Sciences and Agriculture

* AOE	Adult and Occupational Education
* ANSC	Animal Sciences
* BCHM	Biochemistry
* BIOL	Biology
CD	Community Development
* EREC	Environmental and Resource Economics
* EC	Environmental Conservation
* FOR	Forestry
* GEN	Genetics
* MICR	Microbiology
* NR	Natural Resources
NUTR	Nutritional Sciences
* PBIO	Plant Biology
* RAM	Resource Administration and Management
* SOIL	Soil Science
TOUR	Tourism Planning and Development
* WARM	Water Resources Management
* WILD	Wildlife Management
* ZOOL	Zoology

Whittemore School of Business and Economics

ACFI	Accounting and Finance
* ADMN	Business Administration
DS	Decision Sciences
* ECON	Economics
HMGT	Hospitality Management
MGT	Management
MKTG	Marketing

Separate Departments and Programs

ADM	Business Administration—UNHM
ASL	American Sign Language
AMST	American Studies
AERO	Aerospace Studies
CIS	Computer Information Systems
DCE	Division of Continuing Education (all courses)
ECN	Economics—UNHM
* EOS	Earth, Oceans, and Space
GERO	Gerontology
* GRAD	Graduate School
IA	International Affairs
INCO	Intercollege
INTR	Sign Language Interpretation
JUST	Justice Studies
* LS	Liberal Studies
MILT	Military Science
* NRP	Natural Resources Program
TSAS	Thompson School of Applied Science
UNHM	University of New Hampshire at Manchester

College of Liberal Arts

Marilyn Hoskin, Dean
John T. Kirkpatrick, Associate Dean
B. Thomas Trout, Senior Faculty Fellow
Jeffrey Diefendorf, Senior Faculty Fellow
Sally Ward, Senior Policy Fellow

Fine and Performing Arts Division
Department of Art and Art History
Department of Music
Department of Theatre and Dance

Humanities Division
Department of English
Department of Languages, Literatures, and Cultures
Department of Philosophy

Social Science Division
Department of Anthropology
Department of Communication
Department of Geography
Department of History
Department of Political Science
Department of Psychology
Department of Sociology

Teacher Education Division
Department of Education

Bachelor of Arts
Anthropology
The Arts
- Art History
- Art Studio

Classics
Communication
English
English/Journalism
English Teaching
French
French Studies
Geography
German
Greek
History
Humanities
Latin
Linguistics
Music
- Music History
- Music Theory
- Performance Study
- Preteaching

Philosophy
Political Science
Psychology
Russian
Sociology
Spanish
Theatre
Women's Studies

Bachelor of Fine Arts
Fine Arts

Bachelor of Music
Music Education
Organ
Piano
Strings, Woodwinds, Brass, or Percussion
Theory
Voice

It is the purpose of the College of Liberal Arts, as a center of learning and scholarship, to help students achieve an understanding of the heritage of civilization and to educate them in the tradition of the past and realities of the present so they may recognize and act upon their obligations to the future.

The college seeks to meet the educational needs of each student through the development of interests and skills, which, combined with the individual's potential, makes possible a richer, more useful life.

Degrees

The College of Liberal Arts offers three degrees: bachelor of arts, bachelor of fine arts, and bachelor of music.

Bachelor of Arts
These programs primarily provide a broad liberal education along with a major in one of the fields listed on this page. Requirements for the bachelor of arts degree and information regarding these majors are presented on pages 20 and 31.

Bachelor of Fine Arts
This curriculum provides training for students who plan to enter a professional graduate school. Requirements for the bachelor of fine arts degree are outlined on page 32.

Bachelor of Music
This curriculum provides professional training in performance, in musical theory, and in music education, and it allows students to develop their talent to a standard equivalent to the one achieved at conservatories of music. Requirements for the bachelor of music degree and information regarding the curriculum are presented on page 42.

Five-Year Program: B.A.-M.B.A.
The College of Liberal Arts and the Whittemore School of Business and Economics offer a combined five-year program leading to a B.A. degree in French, philosophy, or psychology and an M.B.A. degree. Information about the program can be obtained from those departments or from the undergraduate counselor in the Whittemore School.

Combined Programs of Study
In addition to pursuing a single major, students may combine programs of study as follows:

Minors: See page 21; see also interdisciplinary minors, page 24 and below.
Second Majors: See page 21.
Dual-Degree Programs: See page 21.
Student-Designed Majors: See page 103.
Other combined programs and interdisciplinary opportunities: See page 100.

Interdisciplinary Minors

African American Studies

The African American studies minor provides students with an interdisciplinary approach to a central dimension of United States history, literature, and culture. Many aspects of African American history and culture have been central to the development of the United States, highlighting both the nation's problems and its promise, and affecting virtually all areas of academic study through the years, from the humanities to the sciences. The minor therefore is designed to serve the needs of all students, regardless of their ethnic or cultural background, complementing their work in their major fields of study while serving also as a focused corrective to traditionally marginalized approaches to African American experience.

African American studies consists of five 4-credit courses, including an introductory course, a required history course, and three other approved offerings. Students must take at least one course at the 600 or 700 level. The required core courses provide students with a general understanding of the broad and diverse spectrum of African American history, literature, and culture. Electives enable students to develop that understanding by way of special topics courses in their major fields of study, including some that provide students with an opportunity to relate African American issues to African history and culture. Students must earn a C– or better in each course, and maintain a 2.00 grade-point average in courses taken for the minor. Electives may include a senior seminar.

Students interested in minoring in African American studies should contact the coordinator, John Ernest, Department of English, Hamilton Smith Hall.

Required Courses
ENGL 517/AMST 502, Introduction to African American Literature and Culture
or
INCO 450, Introduction to Race, Culture, and Power
HIST 505 or 506, African American History

Elective Courses
Electives will be approved for the minor, with the consent of the appropriate faculty members, and will be announced each semester. Included in the courses listed below are special topics and other courses (for example, courses covering specific periods in American literature or history) that may sometimes focus on African American studies. Check with the minor coordinator or the course instructor each semester for details. Some courses require special approval by the minor coordinator and course instructor. Possible courses currently listed in the catalog include the following:

ANTH 500D, Peoples and Cultures of the World. Sub-Saharan Africa
ENGL 609/HUMA 609/MUSI 609, Ethnicity in America: the African American Experience in the Twentieth Century
ENGL 581, Introduction to Postcolonial Literatures in English*
ENGL 650, Studies in American Literature and Culture
ENGL 681, Introduction to African Literatures in English
ENGL 690, Introduction to African American Literature
ENGL 693, 694, Special Topics in Literature*
ENGL 695, 696, Senior Honors*
ENGL 795, Independent Study*
ENGL 797, 798, Special Studies in Literature*
HIST 595, 596, Explorations in History*
HIST 600, Advanced Explorations in History*
HIST 603, The European Conquest of America
HIST 609, American Legal History: Special Topics*
HIST 611, Civil War and Reconstruction in the United States
HIST 625, Southern History and Literature since 1850*
HIST 587, 588, History of Africa South of the Sahara
HIST 684, History of Southern Africa since 1820
HIST 695, 696, Independent Study*
HUMA 698, Independent Study in the Humanities*
HUMA 730, Special Studies in the Humanities*
MUSI 513, Introduction to the Music of Africa and Asia
MUSI 795, Special Studies in Music*
POLT 513, Civil Rights and Liberties
POLT 600, Selected Topics in American Politics*
POLT 553, Third World Politics
POLT 620, Selected Topics in Political Thought*
SOC 530, Race and Ethnic Relations
SOC 697, Special Topics in Sociology*
WS 595, Special Topics in Women's Studies*
WS 796, Advanced Topics in Women's Studies*
WS 798, Colloquium in Women's Studies*

* When course content is relevant to the African American studies minor.

American Studies

American Studies is the interdisciplinary study of United States culture in all its varied aspects. Students learn to connect history, art, politics, religion, popular culture, literature, and other features of American life, and to examine both the differences and the similarities among, for example, different racial and ethnic groups, historical periods, and media. We are an intercollege minor drawing courses from thirteen departments. We offer the opportunity to concentrate in Native American Studies. We encourage students to take advantage of the rich resources of the New England region, through internships and independent studies at local museums, libraries, historical societies, and other institutions dedicated to the study and preservation of American culture. Students can also participate in exchange programs at universities with other regional or ethnic studies programs. Independent study, field work projects, and exchanges must be approved by the faculty member supervising the work and by the coordinator of the American Studies minor.

The American Studies minor consists of five courses. Students must take American Studies 501 as early in their careers as possible, preferably before the senior year. In addition, students must take at least one other American Studies course (preferably more), and at least one course concentrating on issues of race, gender, or ethnicity in America (starred [*] courses). Elective courses may not be in the student's major department. No more than two courses of the five may be at the 500 level (departmental prerequisites may be waived for American Studies students at the discretion of the instructor). Students must earn a C- or better in each course, and maintain a 2.0 grade-point average in courses taken for the minor.

Because of the range and breadth of possible American Studies concentrations, students are urged to see the coordinator and fill out an intent to minor form as soon as they become interested in the minor, preferably by the beginning of their junior year. Students may wish to focus their coursework in the minor around a coherent topic, either chronologically or thematically. Examples include, but are not limited to: a specific historical period, (for example, the twentieth century); race, ethnicity, gender, or class in America; popular culture; the arts; regional studies; urban, rural, and natural environments; American institutions (education, sports, religion, etc.). Students wishing to concentrate in Native American Studies are urged to take courses marked below with an (NAS). Students might also consider concentrating their major work in courses related to American Studies.

Interested students should contact the coordinator, Lisa MacFarlane, Department of English, 862-3986, 209 Hamilton Smith.

Two Required Courses
AMST 501, Introduction to American Studies
AMST 502* Introduction to African American Literature and Culture
AMST 603 Photography and American Culture
AMST 604 Landscape and American Culture
AMST 605 Film in American Culture
AMST 607 Religion in American Life and Thought
AMST 608* Women Artists and Writers, 1850–Present
AMST 609* The African American Experience in the Twentieth Century
AMST 610 New England Culture
AMST 612 Periods in American Culture
AMST695/6 Special Topics in American Studies
AMST 697/8 Seminar in American Studies
AMST 795/6 Independent Study

Three Elective Courses
ANTH 500A* (NAS), 501A* (NAS), 697* (NAS)
ARTS 487E, 654, 693, 610
CMN 505, 607, 657
ECON 515
ENGL 512, 515, 516, 517, 522, 525, 616†, 650, 685†*, 690*, 694†, 697/8†, 739(NAS)*, 741(NAS), 742, 743, 744, 745, 746, 747, 748, 749, 750
GEOG 513, 610
HIST 505*, 506*, 507(NAS)*, 511, 520, 566*, 603(NAS)*, 605, 606, 609, 611, 612, 615/616, 619/620, 621/622, 623, 624, 625, 722
MUSI 511, 512*
POLT 500, 504, 508, 512, 513*, 523
SOC 520, 530*, 540, 645
THDA 450, 463
WS 595†, 796†, 798†

† These courses may be taken as electives when the subject is in American studies.

Asian Studies

The Asian studies minor is a coherent program that integrates five classes pertaining to Asia and its people. There are two ways to complete the minor. The first, the "Asian languages track," combines intermediate level language study with three other courses dealing with Asia. The second, the "Asian studies perspective," in addition to the remaining courses needed to complete the minor, allows the student either to (1) study an Asian language at the introductory level; or (2) register for a semester abroad in Asia; or (3) complete two courses pertaining to Asia.

Asian Languages Track
JPN 503 *and* JPN 504*

Asian Studies Perspectives
JPN 401 *and* JPN 402*, *or* semester abroad; *or* two Group B electives (only one [not two] course may be from political science or history)

Group A Electives: (Two required from each discipline)
HIST 579, History of China in Modern Times
or HIST 580, State, Society, and Culture in Modern Japan
POLT 545, People and Politics in Asia
POLT 546, Wealth and Politics in Asia
POLT 556, Politics in China, and POLT 557, Politics of Japan and Southeast Asia, may be substituted for reasons of scheduling and with the approval of the coordinator of Asian studies, for POLT 545 and/or POLT 546

Group B Electives: (One required)
ANTH 500E, People and Cultures of South Asia
ANTH 500F, People and Cultures of Southeast Asia
ARTS 697, Arts of the Far East
ENGL 581, Introduction to Postcolonial Literatures in English
GEOG 541, Geography of Japan
HIST 681, Modern China Topics
PHIL 520, Eastern Philosophy
POLT 556, Politics in China
POLT 557, Politics in Japan and Southeast Asia
POLT 566, Foreign Policies in Asia and the Pacific
POLT 660, Foreign Policy of China (Selected Topics in International Politics)
POLT 797, Seminar in Chinese Politics (Section I: Seminar in Political Thought)

* Japanese taught at UNH. Other Asian languages studied elsewhere may be substituted by approval.

For more information, contact Yan Lu at 862-1764, Horton Social Science Center or the Asian Studies Office in 330 Huddleston Hall.

Cinema Studies

The minor in cinema studies offers a variety of opportunities to study a predominant contemporary form of narrative, aesthetic, and social discourse: the moving photographic image. Film is the primary medium of study for the minor, but the cinematic practices of video and television may also be included as potential areas of interest. Courses consist of interdisciplinary approaches to the analysis of cinema, covering works from the silent period to the present, from the U.S. and other nations, and from "mainstream" and "alternative" groups. Students learn the art, history, technology, economics, and theory of cinema, while also learning the language for analyzing its forms and practices. The minor allows for organized and meaningful study of the moving photographic image, from a wide range of scholarly interests and approaches which complement the increasingly significant place of cinema in many major disciplines and other programs. Students in this program become keenly aware of themselves as members of a culture of the moving photographic image.

Cinema studies students are required to earn twenty credits, with no more than twelve of these at the 500 level. Students must earn at least a C- in each course and maintain a 2.00 grade-point average in courses taken for the minor. "Double counting" of minor course credits with major course credits will be left to the discretion of existing major departments, with the exception that no more than eight credits, if approved, will "double count." Courses in cinema studies should be taken in the following sequence: first, one introductory course, either CMN 550, Cinema and Society, or ENGL 533, Introduction to Film Studies; followed by at least one of the following more advanced and/or focused courses: CMN 650, Critical Perspectives on Film, ENGL 616, Studies in Film, GERM 523, Women and German Film, or GERM 524, Special Topics in German Film; and twelve credits of selected elective courses.

Interested students should contact the coordinator, Peter Mascuch, Department of English, 862-3969, pmascuch@cisunix.unh.edu, 225C Hamilton Smith Hall.

Introductory Courses (One required)
CMN, 550, Cinema and Society or ENGL 533, Introduction to Film Studies

Advanced and/or Focused Courses (One required)
CMN 650, Critical Perspectives on Film
ENGL 616, Studies in Film
GERM 523, Women and German Film
GERM 524, Special Topics in German Film

Elective Courses (Three required)
Electives are drawn from an approved list of courses for the minor, which is compiled and announced every semester. Some electives require special permission by the major department and/or course instructor (such as advanced offerings in a major). The following courses include those that may sometimes have a significant cinema studies component. Check with the minor coordinator or the course instructor each semester for details.

AFAMST 609*, Ethnicity in America: The Black Experience in the Twentieth Century
AFAMST 696*, Special Topics in African American Studies
AMST 696*, Seminar in American Studies
ANTH 697*, Special Topics in Anthropology
ANTH 797*, Advanced Topics in Anthropology
ARTS 799*, Seminar in Art History
CMN 650, Critical Perspectives on Film
CMN 696*, Communication Seminar in Media Studies
ENGL 616, Studies in Film
ENGL 750*, Special Studies in American Literature
FREN 525*, Introduction to French Civilization
FREN 675*, Topics in French Civilization
FREN 676*, Topics in Francophone Civilization
GERM 523, Women and German Film
GERM 524, Special Topics in German Film
GERM 797, 798*, Special Studies in German Language and Literature
HIST 595, 596*, Explorations in History
HIST 600*, Advanced Explorations in History
HUMA 700*, Seminar in the Humanities
HUMA 730*, Special Studies in the Humanities
MUSI 595*, Special Topics in Music Literature
PHIL 780*, Special Topics in Philosophy
POLT 595, 596*, Explorations in Politics
PSYC 591*, Special Topics in Psychology
PSYC 741, 791*, Advanced Topics in Psychology
RUSS 797, 798*, Special Studies in Russian Language and Literature
SOC 797*, Special Topics in Sociology
SPAN 525*, Spanish Civilization and Culture
SPAN 526*, Latin American Civilization and Culture
SPAN 797, 798*, Special Studies in Spanish Language and Literature
THDA 592*, Special Topics in Theatre and Dance
WLCE 600*, Selected Topics in World Literature
WS 595*, Special Topics in Women's Studies
WS 796*, Advanced Topics in Women's Studies
WS 798*, Colloquium in Women's Studies

*When course content is relevant to cinema studies.

History and Philosophy of Science

What is science?

When people ponder this question, they are often led to seek answers outside the sciences themselves. This interdisciplinary minor is planned to help students address historical and philosophical questions about science. In the history of science, we ask: How did we come to hold the beliefs we do about the natural world? How were the great scientists of the past led to the discoveries for which they are

remembered? Why did people in the past have very different ideas on issues like the motions of the heavens or the nature of the human body? It is a puzzling reality of world history that the human understanding of nature, society, and the mind has varied greatly with place and time. This intriguing variety also raises philosophical questions: What separates science from pseudoscience or religion? How can we decide whether scientific knowledge will have good or bad consequences for humanity? Can science ever reach the ultimate truth about the universe?

The minor in history and philosophy of science offers courses in such diverse departments as economics, history, mathematics, philosophy, and psychology. It presupposes no specialized scientific background and may be combined with any undergraduate major. Five 4-credit courses are required for the minor, with no more than three from any single department.

Students interested in taking the minor should contact the coordinator, Jan Golinski, Department of History, Horton Social Science Center.

ECON 615, History of Economic Thought
ECON 698, Topics in Economics*
ECON 798, Economic Problems*
HIST 521, The Origins of Modern Science
HIST 522, Science in the Modern World
HIST 523, Introduction to the History of Science
HIST 621, 622, History of American Thought
HIST 651, 652, European Intellectual History
HIST 654, Topics in History of Science
HUMA 651, Humanities and Science The Nature of Scientific Creativity
MATH 419, Evolution of Mathematics
PHIL 424, Science, Technology, and Society
PHIL 435, The Human Animal
PHIL 630, Philosophy of the Natural Sciences
PHIL 683, Technology: Philosophical and Ethical Issues
PHIL 725, Philosophy of the Social Sciences
PHIL 780, Special Topics in Philosophy*
PSYC 571, The Great Psychologists
PSYC 591, Special Topics in Psychology*
PSYC 770, History of Psychology
PSYC 771, Psychology in 20th-Century Thought and Society

*with approval

Humanities

The humanities minor studies the fundamental questions and issues of Western civilization. (For a more complete description, see Humanities, page 40.) The minor consists of a minimum of 20 credits of academic work (five courses), with a minimum grade of C from the following courses:

Two courses from either the 501/502/503 sequence or the 510/511/512/513/515 sequence
HUMA 501, Humanities: The Ancient World
HUMA 502, Humanities: The Modern World
HUMA 503, Humanities: The 20th Century
HUMA 510, Chance, Necessity, and Reason: The Search for the Good Life
HUMA 511, Fortune, Sin, and Faith: The Search for the Spiritual Life
HUMA 512, Reason, Doubt, and Experience: The Search for the Enlightened Life
HUMA 513, History, Mind, and the Absurd. The Search for the Meaningful Life
HUMA 515, The Twentieth Century, Part II: 1945-1999

Two 600-level humanities courses
HUMA 607, The American Character: Religion in American Life and Thought
HUMA 608, Arts and American Society: Women Writers and Artists, 1850–Present
HUMA 609, Ethnicity in America: The Black Experience in the Twentieth Century
HUMA 610, Regional Studies in America. New England Culture in Changing Times
HUMA 650, Humanities and the Law: The Problem of Justice in Western Civilization
HUMA 651, Humanities and Science: The Nature of Scientific Creativity
HUMA 730, Special Studies in the Humanities

Humanities Program Seminar
Either HUMA 500, Critical Methods in the Humanities, *or*
HUMA 700, Seminar in the Humanities

For more information on the humanities minor, please consult the coordinator, David Richman, 2 Murkland Hall.

Justice Studies

This interdisciplinary minor spans the social sciences and humanities, from criminology to philosophy of law, focusing on the relationship of law and legal systems to issues of social policy. Interested students may plan a course of study that combines various perspectives and ways of reasoning about problems of justice: jurisprudential, historical, philosophical, and scientific. Students with career interests in law, criminal justice, government, and social services are able to pursue the intellectual and practical concerns of their potential careers in conjunction with their regular coursework. The justice studies minor may be combined with any undergraduate major field.

The justice studies minor includes a 4-credit field experience with placements available in law firms, law enforcement agencies, prosecution, criminal courts and court services, civil courts, probation and parole, and corrections. Eligibility for field experience is limited to senior justice studies minors who have not had prior experience in the justice system. Enrollment by application only.

Required Courses
POLT 507, Politics of Crime and Justice, *and/or*
SOC 515, Introductory Criminology
JUST 601, Field Experience in Justice Studies

Elective Courses
Students elect three additional courses from a list approved and published yearly by the Justice Studies Executive Committee. Cooperating departments include history, humanities, philosophy, political science, psychology, social work, sociology, family studies, health management and policy, recreation management and policy, resource economics, and community development

Departmental offerings that are currently accepted for the minor include the following:
CD 717, Law of Community Planning
DCE 552, Corrections Treatment and Custody
DCE 554, Juvenile Delinquency
EC 718, Law of Natural Resources and Environment
FS 794, Families and the Law
HMP 734, Health Law
HIST 509, Law in American Life
HIST 559, History of Great Britain
HIST 609, American Legal History: Special Topics
HUMA 650, Humanities and the Law: The Problem of Justice in Western Civilization
PHIL 436, Social and Political Philosophy
PHIL 635, Philosophy of Law
PHIL 660, Law, Medicine, and Morals
POLT 407, Law and Society
POLT 507, Politics of Crime and Justice
POLT 508, Supreme Court and the Constitution
POLT 513, Civil Rights and Liberties
POLT 520, Justice and the Political Community
POLT 701, The Courts and Public Policy
PSYC 755, Psychology and Law
RMP 772, Law and Public Policy in Leisure Services
SW 525, Introduction to Social Welfare Policy
SOC 515, Introductory Criminology
SOC 525, Juvenile Crime and Delinquency
SOC 650, Family Violence
SOC 655, Sociology of Crime and Justice

Students who are interested in minoring in justice studies should consult with the coordinators, Susan Siggelakis, 320 Horton Social Science Center, 862-1780 or James Tucker, 426 Horton Social Science Center, 862-1814. Students should file an "intent to minor" form with the Justice Studies Program Office by the end of the first semester of their junior year.

Latin American Studies

The Latin American studies minor provides an interdisciplinary approach to the study of Latin America. Latin Americans will soon comprise the largest minority group in the United States. Knowledge of Latin America is especially valuable for students who plan to work in education, international organizations, government, social services and business, as well as for those who plan to undertake graduate study in Latin America.

The minor requires five courses, which represent three disciplines and which do not duplicate requirements of the student's major. Latin American history (HIST 531 or 532) is required. Spanish or Portuguese language courses through the intermediate level are required (completion of SPAN 504 or PORT 504 at UNH; or equivalent courses or equivalency testing). Academic study in Latin America is strongly recommended.

Elective courses must be approved by the Latin American studies minor coordinator or committee. At least 50 percent of any selected course must focus on Latin America. Courses are evaluated on an individual basis to determine acceptability. Suggested possible courses include the following:

AOE 630, Development of Food/Fiber in Third World Countries
ANTH 500B, Peoples and Cultures of the World. South America
EC 535, Contemporary Conservation Issues
FOR 502, The Endangered Forest
HIST 425, Foreign Cultures*
HIST 631, 632, Latin American History
POLT 554, Politics of Central America, Mexico, and the Caribbean
POLT 559, Politics of South America
POLT 565, United States- Latin American Relations
POLT 651, Selected Topics in Comparative Politics*
SPAN 526, Latin American Culture and Civilization
SPAN 622, Latin American and Brazilian Literature in Translation
SPAN 653, 654, Introduction to Latin American Literature and Thought
SPAN 771, Latin American Drama
SPAN 772, Latin American Novel
SPAN 773, Latin American Short Story
SPAN 774, Major Latin American Authors
SPAN 797, 798, Special Studies in Spanish Language and Literature*

* When course content is relevant to the Latin American studies minor

For more information on the Latin American studies minor, call Janet N. Gold, the coordinator, 209 Murkland Hall, 862-1875.

Religious Studies

The Religious Studies Program at the University of New Hampshire currently offers an interdisciplinary *minor*, bringing together courses in several fields that address religion as a cultural, logical, or expressive phenomenon in human history. Religious Studies courses at UNH avoid theological or confessional biases and emphasize multicultural tolerance and diversity.

Requirements of the Religious Studies Minor include the basic two-semester sequence in the History of World Religions (RS/HIST 483 *and* 484), the advanced Minors' Seminar in Religious Studies to be taken one's senior year (RS 699), and at least two other courses either cross-listed in Religious Studies, announced in the *Religious Studies Bulletin*, or otherwise relevant to the study of religion (by student's petition to the program director). Students especially interested in Religious Studies are encouraged to combine the minor with further pertinent coursework in one of the established departments contributing to the program: History, Philosophy, Anthropology, and English. The program director can aid in advising such a major program.

Courses included in the bi-annual *Religious Studies Bulletin* ordinarily have some degree of focus on issues related to the academic study of religion, conceptualizing religion or religious influences as a principal problem, asking comparative questions, and/or developing models of cross-cultural usefulness. Courses listed here are generally offered at least once every two years:

Historical-Cultural
HIST 507, Native Peoples of the Americas
PHIL 520, Introduction to Eastern Philosophy
HIST 585, Middle East History to the Medieval Islamic Era
HIST 587, Africa South of the Sahara
HIST 589, Islam in Africa

Theoretical
PHIL 417, Philosophical Reflections on Religion
ANTH 616, Anthropology of Religion
PHIL 710, Philosophy of Religion
PSYCH 791, Psychology of Religion

Textual
ENGL 518, The Bible as Literature
HIST/RS 576, The Hebrew Bible in Historical Context
HIST/RS 577, The New Testament in Historical Context

Interested students should also be alert for special topics courses in History (HIST 600), English (ENGL 697/698), Anthropology (ANTH 500), and other disciplines that might be relevant to the study of religion. Copies of the *Religious Studies Bulletin*, which includes all such courses each semester, can be picked up outside the director's office.

Students interested in the Religious Studies Minor should see the director to fill out an intent-to-minor form by the beginning of their junior year. For more information, consult the director, David Frankfurter, Department of History, 436, Horton Social Science Center, 862-3015; e-mail davidtf@hopper.unh.edu.

Women's Studies

The women's studies minor offers students an interdisciplinary introduction to the status and contributions of women in various cultures and historical eras. (For a more complete description, see Women's Studies, page 49.)

For the women's studies minor, students must complete 20 credits of women's studies courses. These must include WS 401, Introduction to Women's Studies, and WS 798, Colloquium in Women's Studies, normally taken at the beginning and end of the course sequence, respectively. In between, students should select other women's studies courses or cross-listed courses from departmental offerings.

Other women's studies courses are WS 595, Special Topics in Women's Studies; WS 632, Feminist Thought; WS 795, Independent Study; WS 796, Advanced Topics in Women's Studies; and WS 797, Internships.

Departmental offerings include the following regularly repeated courses:

ARTS 487D, Themes and Images in Art. Major Mythic Images of Women
ARTS 690, Women Artists of the Nineteenth and Twentieth Centuries
CMN 567, Images of Gender in the Media
CMN 583, Gender and Expression
ECON 698, Topics in Economics: Women in Economic Development
ENGL 585, Introduction to Women in Literature
ENGL 586, Introduction to Women Writers
ENGL 685, Women's Literary Traditions
ENGL 785, Major Women Writers
FS 645, Family Relations
FS 757, Race, Class, Gender, and Families
HIST 565, Women in Modern Europe
HIST 566, Women in American History
NURS 595, Women's Health
PHIL 510, Philosophy and Feminism
SOC/ANTH 625, Female, Male, and Society

Students may complete the minor requirements by selecting from other courses that are offered as special topics by the departments. In the past, such offerings have included the following: ANTH 697, Women in the Middle East; FREN 525, French Women: Subject and Object.

Students who wish to minor in women's studies should consult with the coordinator, 203 Huddleston Hall, 862-2194.

Other Programs

Languages

The programs in French, Italian, German, Classics, Spanish, Portuguese, Russian, and Japanese have merged into a single Department of Languages, Literatures, and Cultures. For information, phone 862-4005. Students interested in details on these programs should call the program coordinators named above the course listings.

Majors and minors in French, German, Greek, Latin, Russian, and Spanish, and a minor in Italian (see page 173); are offered. Courses are also offered in Chinese, Hittite, Japanese, Portuguese, and Sanskrit.

World Literatures and Cultures in English

(For descriptions of courses, see page 218.)

The Department of Languages, Literatures, and Cultures offers a series of courses covering a range of culture, film, and literature topics. Taught regularly, these courses are designed to acquaint the student with a given country's literary and cultural practice and to provide insight into a society other than one's own. As introductions to non–U.S. cultures, WLCE courses may supplement study in the areas of history, humanities, and English with all the readings, papers, and tests in English.

Special Centers

Center for the Humanities

The Center for the Humanities, located in Huddleston Hall, was established in 1986 to support the arts and humanities at UNH. It currently involves about a dozen departments and more than 125 faculty members from across the University, representing such fields as literature, fine arts, anthropology, philosophy, folklore, history, religious studies, and foreign languages and literature.

Participation in the activities of the center is open to faculty members from across the University who are interested in the humanities, broadly defined. The center acts as a forum for discussion and intellectual cross-fertilization regarding humanistic issues and perspectives; it fosters and supports creative research in the humanities, both within and among disciplines; it assists humanities faculty (broadly defined) in their educational and curricular activities in general, and in the development of interdisciplinary courses and programs in particular; it serves the humanities faculty, students, programs, and community by assisting in the development and dissemination of educational and research materials; it fosters and develops outreach activities in the humanities for the state and region; and it is a focus for the humanities within the University, the state, and the region.

Institute for Policy and Social Science Research

The Institute for Policy and Social Science Research, located in Thompson Hall, provides financial and administrative support for social, behavioral, cognitive, and policy-related research at the University. It also works to raise the contribution that UNH faculty and students can make to public decision makers in universities, communities, New Hampshire, and the Northeast.

Work of the institute is conducted within a set of broad themes. These reflect concern for sustaining natural environments, achieving peace and social equity, providing public education, sustaining economic development, developing innovative teaching methods, substance abuse, and increasing knowledge about human cognition and social behavior. The institute helps faculty to secure external research funds, aids in the dissemination of results, conducts short courses for senior public officials, offers research facilities to house interdepartmental groups, hosts foreign visitors to the University, and provides students with opportunities for internships in public offices.

One special resource of the institute is its UNH Survey Center—an advanced, computer-assisted, telephone-interviewing facility to gather and report on public attitudes about important issues. Another is the Laboratory for Interactive Learning, a facility that collects, designs, publishes, and disseminates innovative, group-centered learning materials. Of special interest is the laboratory's extensive library of educational games. A third facility operated in collaboration with the Department of Kinesiology, is the Browne Center, a 100-acre campus offering leadership and team-building workshops to more than 6,000 people each year. The Institute manages a long-term project on substance abuse prevention in New Hampshire.

Programs of Study

The bachelor of arts programs provide a broad liberal education with a concentration involving a minimum of 32 credits in a major field. Departments may specify certain (but not more than thirteen) required courses. Students must declare a major before the beginning of the junior year. Degree candidates also should satisfy the foreign language proficiency requirements by the start of their junior year. A bachelor of fine arts degree program and a bachelor of music degree program are also available (see Arts and Music). The objectives, opportunities, and departmental requirements of these programs are described below.

Anthropology

(For descriptions of courses, see page 124.)

Anthropology asks the question: What does it mean to be human? Students explore the unity and diversity of human experience. Through courses that cover a wide range of societies throughout the world, we investigate the human condition, past and present. Introductory courses provide an overview of the fields of anthropology: social and cultural anthropology, archeology, physical anthropology and linguistics. More advanced courses provide the opportunity for students to pursue intensive study of particular topics in cross-cultural perspective. The department emphasizes critical thinking and writing skills and encourages close faculty/student contact in seminar courses at the upper level. Students have the opportunity to take courses in other departments that complement specific foci in anthropology.

Because anthropology engenders a broad overview of diverse peoples and

cultures, majors are well-prepared to live in a rapidly changing world. The major both prepares students for graduate-level studies and serves as a foundation for a wide range of careers. With backgrounds in anthropology, our students become teachers, social workers, public policy experts, forensic investigators, health practitioners, primatologists, international business executives, and community and economic development specialists, as well as pursuing various other careers.

Majors must complete a minimum of 36 credits with grades of C- (1.67) or higher and a grade-point average of 2.00 or better, distributed as follows:
ANTH 411, 412, 518, and 600.
One topical course (ANTH 516, 519, 610, 614, 616, 618, 625, 630, 714, or 770).
One area course ANTH 500 (A, B, C, D, E, F, G, or Z) or ANTH 501 (A, B, C, D, or E).
Any other three courses in anthropology or related disciplines approved by the supervisor.
Honors in major and senior thesis options are also available.

Students wishing to major in anthropology should consult with the anthropology chairperson.

A minor consists of five 4-credit courses in anthropology with a C- or better in each course.

Art and Art History

(For descriptions of courses, see page 126.)
The courses offered by the Department of Art and Art History provide an opportunity, within the liberal arts framework, for students to acquire a thorough knowledge of the basic means of visual expression, to study intensively the history of art, or to prepare themselves for a career in art teaching. In addition, these courses offer foundation experience for students who are interested in art but are majoring in other departments in the University. The Department of Art and Art History offers programs leading to a bachelor of arts degree in either studio art or art history and a bachelor of fine arts degree in studio art. Certification for art teaching in the public schools is also offered in cooperation with the Department of Education (see Education, page 34). Students who major in either studio art or art history must fulfill the fine arts general education requirement with a course outside the Department of Art and Art History.

Studio Art Major

Candidates applying for admission to the bachelor of arts program and all students wishing to transfer from other schools into the studio art major are required to submit a portfolio. Students already matriculated at the University may declare a studio art major (bachelor of arts degree) after having completed two studio art courses in the Department of Art and Art History with an average of C+ or above; one of these must be ARTS 532, Introductory Drawing. Students enrolling as freshmen at the University may become studio art majors by either of two methods: (a) by admission through acceptance of a portfolio submitted during the senior year of high school; or (b) by entering the University as an undeclared major and taking two studio art courses in the Department of Art and Art History with an average of C+ or above; one of these must be ARTS 532. The University reserves the right to retain selections from a student's work for a period of not more than two years.

Bachelor of Arts Curriculum (Studio)

Students selecting to work toward a bachelor of arts degree in studio art must complete a minimum of twelve courses (48 credits), of which the following are required:

ARTS 532, Introductory Drawing

One of the following:
ARTS 501, Ceramics
ARTS 525, Woodworking
ARTS 567, Introductory Sculpture

One of the following:
ARTS 536, Introduction to Printmaking: Intaglio
ARTS 537, Introduction to Printmaking: Lithography
ARTS 551, Photography

One of the following:
ARTS 544, Water Media I
ARTS 546, Introductory Painting

Three additional courses in a studio concentration
Two additional studio electives
ARTS 580, Survey of Art History I
ARTS 581, Survey of Art History II
One 600-level art history course

While these courses represent the minimum departmental requirements for the studio art major, students may wish to plan a program involving greater depth in one or several of the studio areas.

Art History Major

The art history major provides a comprehensive, in-depth study of Western art from the ancient world to the late twentieth century and some exposure, as well, to non-Western cultures and artistic traditions. All courses in the program teach basic skills of interpretation and critical analysis within the framework of broad cultural perspectives that connect the visual arts to larger historical developments. They also teach good writing and research skills. In addition, art history majors typically branch out into other fields, such as history, literature, and foreign languages. By the time they graduate, most majors are well equipped to pursue such traditional careers in the field as museum and gallery work, teaching, publishing, or librarianship. But because art-historical education is so broad, it also prepares students for a variety of other, more flexible options. For example, art history is one of the favored majors for admission to professional schools in fields such as law, business, or medicine, not to mention architecture.

Students must complete a minimum of eleven courses (44 credits), of which the following are required: either ARTS 580-81 or ARTS 480 and one other 400- or 500-level course (other than ARTS 580-81), all of which must be passed with a grade of at least B-; five 600- or 700-level courses (at least one each from the following categories: Pre-Renaissance, Renaissance/Baroque, modern, and architectural history); ARTS 795, Methods of Art History; ARTS 799, Seminar in Art History; ARTS 532, Introductory Drawing; and one other studio course. Art history majors receive preferential placement in ARTS 532. Students contemplating graduate school should learn German and, if possible, either French or Italian.

Bachelor of Fine Arts Major

Incoming freshmen applicants wishing to enter the bachelor of fine arts (B.F.A.) degree program must first apply for, and be admitted to, the bachelor of arts (B.A.) studio arts major. After taking the introductory studio art courses at UNH, interested students can then seek out two faculty members to sponsor their application for the B.F.A. program. Studio majors generally wait until they are well into the intermediate level courses before submitting a portfolio for the B.F.A. review which is held before a full

faculty committee twice a year.

The B.F.A. curriculum provides training for students who plan to enter professional graduate school or pursue careers as professional artists. Students selecting to work toward a B.F.A. degree must complete a minimum of 84 credits of which the following courses are required:

ARTS 532, Introductory Drawing
ARTS 546, Introductory Painting
ARTS 551, Photography
ARTS 567, Introductory Sculpture
ARTS 580, Survey of Art History I
ARTS 581, Survey of Art History II
ARTS 598, Sophomore Seminar
ARTS 632, Intermediate Drawing
ARTS 798, Seminar/Senior Thesis (8 credits)
Six courses in a studio concentration
Three additional art electives
Two 600-level art history courses

The possible areas of concentration within the department are: (1) painting, (2) sculpture, and (3) individualized programs. Individualized programs may be designed in the following subject areas: (a) ceramics, (b) drawing, (c) printmaking, (d) photography, and (e) furniture design. Proposals for individualized programs are accepted only by permission of the departmental chairperson, the major adviser, and the departmental bachelor of fine arts committee. Candidates applying for the bachelor of fine arts program are required to submit a portfolio to the B.F.A. committee, which meets each semester one week before preregistration.

Art Education Curriculum

The program in art education is organized into a five-year, teacher-education sequence.

This curriculum is designed to prepare teachers of art in the public schools. Completion of the B.A. or B.F.A. degree *and required education courses* before a fifth-year internship is necessary for teacher certification. The satisfactory completion of the B.A. or B.F.A. curriculum *and required education courses* and the fifth-year internship will satisfy the initial certification requirements for teachers of art in the public schools of New Hampshire and in most other states.

Art education majors may take accredited crafts courses at other institutions as art electives.

Minor in Architectural Studies

The minor in architectural studies provides students with an interdisciplinary introduction to the history, theory, and methods of architecture and its symbolism. The program allows students who are interested in this field to receive programmatic recognition for their work. It is designed to assist those who (a) are contemplating enrollment at a school of architecture; (b) are particularly interested in architectural history; (c) want to supplement their technical majors (e.g., civil engineering) with strong academic minors; or (d) plan to pursue careers in preservation, education, community service, and public relations.

The minor in architectural studies consists of 20 credits (ordinarily five courses) distributed in the following way:

Two courses in architectural history chosen from
ARTS 574, Architectural History
ARTS 654, 17th- and 18th-Century American Architecture
ARTS 655, Early Modern Architecture. Revolution to World War I
ARTS 656, Contemporary Architecture: The Buildings of Our Times
ARTS 799, Seminar in Art History

The course in architectural graphics and design
ARTS 455, Introduction to Architecture

A beginning course in drawing
ARTS 532, Introductory Drawing

An elective
Chosen in consultation with the program coordinator of the architectural studies minor (an additional course in architectural history, a studio course, or some other appropriate elective)

Admission to the minor will be authorized by the program coordinator. Interested students should consult with the coordinator in advance of selecting the minor.

Minor in Art

The minor in art consists of five courses (20 credits) chosen from the offerings of the department, two of which must be at the 500 level or above.

Classics

(For descriptions of courses, see page 134.)

While it is true that classical Greek and Latin are no longer spoken languages, the literature and art of the Ancients speak to us still. To study the classics is to come into direct contact with the sources of Western civilization and culture, both pagan and Christian. An intimate knowledge of our Greco-Roman heritage furnishes students of the classics with historical, political, and aesthetic perspectives on the contemporary world. An undergraduate classics major provides excellent preparation for careers not only in academic, but also in nonacademic professions. A background in classics is, moreover, highly advantageous for applicants to graduate and professional schools in English, modern languages, history, philosophy, law, medicine, and theology. Finally, for the qualified student who is undecided about a major but interested in a sound liberal arts education, classics may be the best option.

The classics major is offered by the classics program of the Department of Languages, Literatures, and Cultures. The minimum requirements for a major in classics are 40 credits offered by the classics section. Twenty-four of these must be in Greek and/or Latin. A classics major must complete as a minimum a 700-level course in one of the classical languages. Students will be encouraged to take courses in related fields such as ancient history, classical art, modern languages, and English, and to take part in overseas study programs in Greece and Italy. For the requirements of the Greek and Latin majors, see pages 39 and 41.

A minor in classics consists of five courses (20 credits) in classics, Greek, and/or Latin.

The coordinator is Richard V. Desrosiers.

Communication

(For descriptions of courses, see page 135.)

The Department of Communication offers a major that emphasizes a range of integrative studies in human communication, including rhetorical studies, media studies, and interpersonal/small group studies. Students are taught analysis of communication transactions through historical, critical, and empirical investigations. Students examine verbal, nonverbal, and mediated messages across a wide spectrum of communication interactions: intrapersonal, interpersonal, group, and mass. They explore connections and interrelationships among various types of communication, theoretical perspectives, and methodological approaches.

While the major emphasizes critical analysis and understanding grounded in theory and research, application of un-

derstanding to a variety of communication settings and processes is an important dimension of study.

Students wishing to declare communication as a major should contact the director for majors, Professor Sally Jacoby, for application information and requirements.

Majors must complete nine courses (36 credits). The distribution of required courses for the major is as follows:

1. CMN 455, 456, and 457. Students must earn a grade of C or better in each of these courses.
2. Three 500-level courses (12 credits), one from each of the following groups:
   a. Media Studies: CMN 505, 515, 519, 550, 567, 596
   b. Rhetorical Studies: CMN 504, 507, 557, 597
   c. Interpersonal Studies: CMN 503, 506, 530, 572, 583, 598
3. Three 600- and/or 700-level courses (12 credits). A maximum of 4 credits of independent study (CMN 795) may be counted.

Transfer students must complete 18 credits of their communication coursework at UNH to complete the major satisfactorily. Exchange students may transfer no more than 10 approved credits from another institution to be applied toward completion of the communication major at UNH.

A minor is confined to coursework in rhetoric and public address. Five courses (20 credits) are required for completion of the minor. Students must complete CMN 456, Propaganda and Persuasion, with a grade of C or better. Any additional four rhetoric courses with a grade of C– or better from the following list will satisfy the minor requirements, however, one of the listed 500-level courses is required prior to enrollment in any 600- or 700-level course: CMN 500, 504, 507, 557, 604, 605, 607, 656, 657 (may be taken more than once, with different topics), 670, 697, 703, and ENGL 503.

Education

(For descriptions of courses, see page 145.)

Basic Programs

The Department of Education programs prepare teachers, counselors, reading specialists, special educators, and administrators who demonstrate excellence in their field and who will become educational leaders.

Most students who plan to teach in elementary and secondary schools apply to the five-year program. In the five-year program students begin preparation for teaching at the undergraduate level with a semester of field experience and professional coursework in education. Students complete a baccalaureate degree outside of education and move into a fifth year of study and a full-year internship leading to the M.Ed. or M.A.T. degree and licensure for teaching.*

There are also opportunities for certification at the graduate level in counseling, early childhood, reading, and special education. The department encourages students interested in graduate study or in relevant undergraduate courses to meet with graduate program coordinators in the Department of Education.

Students in music, mathematics, nursery school/kindergarten, and adult and occupational education have the option of choosing a basic four-year undergraduate program for licensure. Students in these departments should consult with their advisers.

*Students in the five-year program may combine their program for teacher licensure with a master's program in their major field department.

Program Philosophy and Mission

Unit Mission Statement

The following conceptual framework guides all of the programs which prepare professionals in education at the University of New Hampshire.

The professional education unit at the University of New Hampshire seeks to prepare practitioners who will become leaders in their own practice settings and within their profession, applying knowledge to improve education for all students and enrich the lives of clients. Immersion in subject matter, research, theory, and field-based experience provides a base for our graduates to make well-reasoned judgments in complex situations, render informed decisions, model exemplary practice, and take initiative for planned change. Students learn to establish caring environments which celebrate individual differences and backgrounds while fostering cooperation and educational improvement. We stress reflective critical inquiry as a mode of study and community-building as a means for promoting change. We value and support both our students' local practice and their broader leadership within the profession.

Mission of Programs in Teacher Education

The following mission statement gives direction to the basic and advanced programs in teacher education.

We seek to prepare beginning teachers who demonstrate excellence in classroom practice and who will become educational leaders. Our graduates will possess the knowledge, skills, and dispositions required for outstanding classroom practice and eventual leadership within the local school community and the larger education community.

Program Themes

Excellence in Practice

We expect our students to gain mastery of subject matter, command professional knowledge, and acquire a good grounding in general education, including global perspectives regarding diverse cultures and environments. They will recognize how knowledge in their subject matter areas is created, organized, and linked to other subjects. Upon graduation, they should possess a specialized knowledge of how to teach subject matter to their students and employ multiple, motivational approaches in teaching their subjects. They will know how to orchestrate learning in group settings, placing a premium on student engagement and thoughtfulness. They will remain mindful of their teaching and learning objectives through selection and use of appropriate measures.

In their commitment to students and their students' learning, our graduates will recognize diverse backgrounds and perspectives in their students as well as individual development. They will be able to adjust their practice to meet students' needs, working diligently to help each student reach his or her full potential. They will create and contribute to a classroom atmosphere which fosters a community of learners, establishes an atmosphere of mutual respect and caring, and cultivates a celebration of diversity.

We expect our graduates to be thoughtful and reflective practitioners who learn from experience. They will be capable of making choices and decisions in complex and demanding situations, analyzing the effects of their actions, taking into account moral and philosophical implications. They will seek to improve their practice by observing others, seeking advice, and drawing upon educational research and scholarship.

Leadership in the Profession
We believe that, over time, our graduates will become well-informed decision makers and agents of change, providing leadership within the school community and profession. We seek to equip our graduates with the knowledge, skills, and dispositions necessary for such leadership, but we recognize that development and demonstration of leadership skills takes time and practice within the professional setting. Through study and experience, our graduates will learn to assess the relative merits of educational reform efforts, determining their appropriateness to the classroom, the institution, and the broader societal contexts in which reform is implemented. Drawing upon current theories and research in education, graduates will be able to develop and articulate their own conceptual and philosophical perspectives on teaching and learning. We expect them to develop an understanding of how leadership is informed by varied perspectives on the structure of public education, the nature of educational change, and the teacher's role in the change process. They should be willing to take risks in advocating for high levels of quality within the teaching profession. We expect them to become active members of learning and professional communities. In doing so, they will engage colleagues in their own and other's teaching, learning, and professional development. They will be able to work collaboratively with all members of the community—students, peers, specialists, parents, etc., to contribute to effective learning environments. They will continue to be active learners, participating in professional organizations, pursuing avenues of inquiry through study, research, and dialogue while taking into account the moral and ethical implications of their professional practice and efforts to enhance the school, community, and profession.

Our two program themes, Excellence in Practice and Leadership in the Profession, are reflected in the goals and expected student outcomes that form the basis of our program.

Phase I. Enroll in Exploring Teaching: Education 500.
Goals of Exploring Teaching
Throughout all phases of the UNH teacher preparation programs, we stress the importance of excellence in the classroom, and classrooms are where the UNH teacher preparation program begins. Exploring Teaching is the initial phase of the teacher preparation program. Students in Exploring Teaching spend 5 hours per week in local classrooms to obtain realistic views of current classroom practices. These views provide a backdrop for students to explore what excellence in teaching means to them and to begin the process of deciding whether or not to pursue a career in education.

Students are encouraged to take Exploring Teaching as a sophomore, but completion during junior year could also leave enough time for other education course requirements.

Exploring Teaching is also available through the Live, Learn, and Teach Summer Program which is open to juniors and seniors. For information, contact the Department of Education, 203 Morrill Hall. A positive recommendation from the Exploring Teaching instructor is required before further coursework is taken in the teacher education program.

Phase II. Professional Coursework in Education at the Undergraduate Level
Education 500 is a prerequisite to further work in the teacher education program. An undergraduate receives a coadviser in the Department of Education (usually the Exploring Teaching instructor). This coadviser works with the students, along with the major adviser to plan the undergraduate portion of the teacher education program.

Every student must take 4 credits in each of four areas (EDUC 700, Educational Structure and Change; EDUC 701, Human Development and Learning: Educational Psychology; EDUC 703, Alternative Teaching Models; EDUC 705, Alternative Perspectives on the Nature of Education). EDUC 707, Teaching Reading through the Content Areas, is required for some secondary subject licensure areas. Elementary education students are required to have four methods courses: one each in the teaching of reading, mathematics, science, and social studies. Those who do not intend to use this coursework for initial licensing may enroll with instructor permission. All 700-level education courses at UNH are restricted to students with junior or senior standing.

Any course taken in the Department of Education that will be used for a teacher licensure requirement must be completed with a grade of B– or better.

Phase III. Internship and Graduate Phase of the Program
Undergraduates should apply to the Graduate School during the first semester of their senior year for the final phase of the teacher education program.
The final phase of the program includes a full-year internship, a 12-credit graduate concentration, electives, and a concluding project or thesis. This phase normally takes at least an academic year plus a summer to complete.

The yearlong internship (EDUC 900/901) is part of the final stage of the five-year program. It meets the goals of increased clinical experience and better integration of theory and practice.

The internship is a teaching and learning experience in which the intern is involved in an elementary or secondary school over the course of an entire school year. Interns become a part of the school staff, sharing appropriate instructional tasks, and often carrying the full instructional duties in one or more classes.

Interns are supervised by a school staff member who is designated as a "cooperating teacher." A UNH faculty member collaborates in intern supervision and conducts a weekly seminar for all interns with whom he/she is working.

The internship is a full-time experience for 6 graduate credits each semester. It typically begins in September and runs through May or June. Due to the intensive time commitment, it is recommended that, at most, only one course be taken in addition to the internship each semester.

Before the internship, all students will have completed a bachelor's degree with a major outside of education. Because of this, they will possess a depth of knowledge in a subject area and a broad general education, in addition to substantive preparation for teaching. Secondary education candidates must have completed an approved major, or its equivalent, in the subject that they intend to teach. Elementary education candidates may pursue an undergraduate major in any area; however, majors in the core disciplines taught in elementary schools are desirable.

Undergraduates should apply for internship in September/October of their senior year. At the same time, it is advisable to begin the application process for graduate school. Arranging an appropriate placement is a time-consuming process. Starting early will facilitate finding the best setting for your needs and goals. The director of field experiences in

Durham and the director of teacher education at Manchester play a major role in identifying internship sites and should be consulted regarding placement. Internship applications are available at the Department of Education, Durham, and the Office of Teacher Education, Manchester. Admission to the internship requires a completed application to the internship, admission to the graduate school, and a consultation with the director of field experiences.

Admission to the Program

Admission to Phase I

Exploring Teaching is open to all students subject to available space. Approximately 150 students are accepted each semester.

Admission to Phase II

Continuation in Professional Coursework is dependent upon positive recommendations from Education 500, Exploring Teaching.

Admission to Phase III

Admission to the Internship and the Graduate Program requires acceptance to the Graduate School. The process is competitive due to high admissions standards and limited space in the program. Approximately 75 percent of applicants for Phase III are accepted.

In determining admission of students to teacher education graduate programs, several criteria are used:

1. Undergraduate G.P.A.

The undergraduate grade-point average of the middle 50 percent of students admitted to the graduate programs in teacher education falls in the range of 2.91–3.46. Students with an undergraduate grade-point average below 2.67 are usually not admitted.

2. The Graduate Record Examination Scores

The Graduate Record Examination (GRE) scores of the middle 50 percent of students admitted to the graduate programs in teacher education fall in the following range: Verbal, 430–550; Quantitative, 450–610; Analytical, 480–640. Students with scores below 400 are usually not admitted.

3. Recommendations

Positive recommendations from EDUC 500, Exploring Teaching, or the equivalent and from those able to relay information about a candidate's performance in teaching situations or related areas. Recommendations from subject major professors are also important.

In our admission process, we seek evidence that our students have the following knowledge, abilities, and dispositions: (1) motives to teach that include a strong social commitment to contribute to society through education; (2) a disposition to care for their students—each and every one; (3) an ability to interact positively with children and adults; (4) a capacity to win the respect of their peers and be effective in group interaction, showing openness to the needs and views of others; (5) well-developed communication skills, including speaking, writing, and listening skills as well as an ability to engage others in both the giving and receiving of information and feelings; (6) perceptiveness—the ability to identify and process the relevant details in their environment, especially in the context of a classroom; (7) the ability to make reasonable judgments in a context of complex situations that change from moment to moment; (8) the capacity for clear thinking and an ability to translate their thoughts into simple and clear explanations; (9) superior academic skills, extensive knowledge of at least one major discipline, intellectual curiosity, and the ability to be open to the unknown; (10) a disposition to take charge of their own learning, which includes the active pursuit of feedback and the willingness to take thoughtful risks.

Early Admission

Provision exists for UNH seniors to apply for "early admission" to the Graduate School, i.e., admission for the second semester of the senior year. Such candidates may petition to have up to 8 credits in graduate coursework simultaneously count toward the bachelor's and master's degree. A student must be admitted to the Graduate School before the start of the semester in which the course(s) will be taken in order to receive graduate credit. A minimum of a 3.2 cumulative grade-point average is required to qualify for early admission.

A student would apply for early admission on the regular graduate school application.

Four-Year, Undergraduate Option

A bachelor's degree including a one semester teaching requirement allows students to be recommended for licensure in certain specialized areas. Those areas are: mathematics, music, nursery/kindergarten education, and adult/occupational education.

These program options include a major appropriate for the licensure being sought, in addition to these core professional courses or their equivalent: EDUC 500, Exploring Teaching; EDUC 700, Educational Structure and Change; EDUC 701, Human Development and Learning: Educational Psychology; EDUC 703, Alternative Teaching Models; EDUC 705, Alternative Perspectives on the Nature of Education; and EDUC 694, Supervised Student Teaching.

The nursery/kindergarten program, because of its emphasis on the young child, has an equivalent set of core courses. FS 708/709 is the equivalent of EDUC 500; FS 743 is the equivalent of EDUC 700; FS 623, 635, and 525 are the equivalent of EDUC 701; FS 734, MATH 621, EDUC 706, 750, 751, or 760 are the equivalent of EDUC 703; FS 733 is the equivalent of EDUC 705; and FS 785, 786, and 788 are the equivalent of EDUC 694.

For admission to supervised student teaching, a minimum 2.50 overall (2.80 for nursery/kindergarten) grade-point average at the time of application is required. Students in music, mathematics, and adult and occupational education need to apply by February 15 of the junior year for student teaching to the Department of Education.

In addition to the four-year undergraduate licensure option, the five-year program with full-year internship and master's degree is available in mathematics, music, and adult and occupational education. Many students who complete the nursery/kindergarten program also go on to complete the five-year program in elementary education. This extends the license to teach to grades 1–8.

Students may also become licensed for kindergarten through grade three (early childhood licensure) by completing the master's degree program in early childhood.

English

(For descriptions of courses, see page 149.)

Through studying a wide variety of literary materials, English majors deepen their understanding of history, culture, language, and human behavior. They also gain skill in writing, reading, and critical thinking. Upon graduation, En-

glish majors traditionally enter a broad range of vocational fields and areas of graduate study.

The Department of English offers three majors: the English major, the English teaching major, and the English/journalism major. It also offers courses in writing nonfiction, fiction, and poetry; courses in linguistics; courses in film; courses in folklore; and courses for honors in English.

The English Major

The English major has two chief objectives: to provide all students with a common core of literary experience and to provide each student with the opportunity of shaping a course of study to suit individual interests. The flexibility and freedom inherent in the second of these objectives places a responsibility upon students to devise a program that has an intelligent rationale. For example, students who intend to pursue graduate study in literature written in English should choose more than the minimum number of advanced literature courses and should seek a broad, historical background. Students with special interests in linguistics or writing may, on the other hand, wish to elect only the minimum number of advanced literature courses required for the major. All students should secure the assistance and approval of their advisers in formulating an early plan for the major program.

For the English major, students must complete a minimum of 40 credits of major coursework including ENGL 519 or 529, two additional 500-level courses, and seven courses numbered 600 and above. Students should see their adviser about minimum grade requirements in major courses. In selecting these courses, students must be sure to meet the following distribution requirements:

1. Two courses in literature before 1800: either two advanced courses (numbered 600 or above), or one advanced course and ENGL 513.

2. Two courses in literature since 1800: either two advanced courses, or one advanced course and one course from the following list: ENGL 514, 515, or 516.

Students interested in majoring in English should consult Tory Poulin, Coordinator of the Department of English, 862-1313.

The English Teaching Major

This major is designed for students wishing to teach English in middle or high schools. Completion of this undergraduate major does not in itself, however, meet state certification requirements. To meet these requirements, students should enroll in the undergraduate major and, by September 15 of their senior year, apply for the fifth-year teaching internship and master's degree program. (For a full description of the program, see page 34.) Undergraduate English teaching majors must pass the following English courses with an average of 2.50 or better: ENGL 514, 516, 519 or 529, 619, 657, 725-726 or 710 and 792, 718 or 791, and two additional literature courses numbered 600 or above. ENGL 513 may be substituted for one of these two courses.

Students who are interested in majoring in English teaching should consult the director of the English teaching program.

The English/Journalism Major

The English/journalism major is designed for students considering careers in print journalism or related fields. Students who complete the program are ready for entry-level writing or editing positions on newspapers or magazines.

The program allows students to develop their writing, reporting, and editing skills while developing a strong background in English literature. English/journalism majors must complete the literature requirements of the standard English major. In addition, they must complete ENGL 621 (Newswriting), ENGL 722 (Feature Writing), at least one other on-campus journalism course, and an internship (ENGL 720) approved by the director of the journalism program. Many journalism students work for the on-campus student newspaper, *The New Hampshire*. Many students hold summer jobs in journalism, and some have part-time journalism jobs during the school year.

Students interested in the English/journalism major should see Tory Poulin, Coordinator of the Department of English, or a program faculty member.

Writing Programs

The Department of English offers courses for students interested in becoming writers. Up to four consecutive creative writing workshops can be taken in fiction or in poetry, as well as a course in form and theory of either genre. The instructors for these courses are professional writers. Interested students should inquire at the departmental office.

French

(For descriptions of courses, see page 160.)

The French Major

Offered by the Department of Languages, Literatures, and Cultures, the French major provides knowledge of the language, literature, and culture of France and other French-speaking countries. An undergraduate major in French is useful in a number of careers, such as teaching, business, law, and social service. Prospective teachers should see page 34. In addition, they should include LING 505 (which also satisfies a general education requirement for group 7) in their overall program and make special note of the FREN 791 requirement which does not count toward completion of a major in French. Students interested in nonteaching careers are urged to consult with members of the French faculty and with other appropriate departments early in their academic careers.

A major consists of 40 credits in courses numbered 631 or above, in which readings are in French. Majors are required to take FREN 631-632, 651, 652, 790, and at least two 700-level literature courses at the Durham campus. Students are required to enroll in at least one course each semester in their major program and to spend at least one semester abroad in a French-speaking country. The year-long UNH Junior Year in Dijon Program is highly recommended. Other options are available, but non-UNH programs must be chosen in close consultation with a major adviser. Transfer students must earn a minimum of 12 major credits at the Durham campus. To complement their major, students are strongly encouraged to take either HIST 647 or 648 and courses in the literature of other countries as well as in fields such as music, art, philosophy, history, political science, and sociology that provide insight into nonliterary aspects of culture.

The French Studies Major

This major gives students a variety of perspectives not only on French culture but also on Francophone cultures worldwide. A major in French studies prepares graduates to negotiate successfully the economic reality of an increasingly international job market, and provides them with a wide range of career prospects after they leave the University.

The major consists of 44 credits in French courses numbered 631 or above and of cross-listed courses in other de-

partments, including the following requirements: FREN 631-632, 651, 652, 675 or 676, 677, 790, and two 700-level courses in French or Francophone literature. In addition, at least three elective courses (12 credits) closely related to French and Francophone cultural studies are required. These are to be chosen in consultation with a faculty adviser from among the following departments: history, geography, or anthropology, one 600- to 700-level course; art history or music, one 600- to 700-level course; economics, political science, or education, one 600- to 700-level course. Students are required to enroll in at least one course each semester in their major program and to spend at least one semester abroad in a French-speaking country. The year-long UNH Junior Year in Dijon Program is highly recommended. Other options are available, but non-UNH programs must be chosen in close consultation with a major adviser. Students are required to enroll in at least one French course each semester abroad.

The French Minor
A minor in French consists of 20 credits in French courses numbered 503 and above. No fewer than three courses have to be taken at UNH. No more than one course conducted in English (e.g., FREN 525, 621, 622) will be counted toward the minor, although students may elect to take more than one such course provided they earn more than 20 credits. Members of the department supervise the work of both majors and minors.

The French Studies Minor
The minor in French studies consists of 20 credits: French 503, 504, 525 or 526, 631 and 632. French 425 is a prerequisite for completing the minor. Those entering this course of study at the level of 504 will be expected to complete French 651. No fewer than three courses have to be taken at UNH. No more than one course conducted in English will be counted toward the minor. In addition, FREN 791 does not count toward the minor. Members of the department supervise the work of both majors and minors.

Study Abroad Opportunities
The department offers a junior year abroad at the University of Burgundy in Dijon, France (see FREN 685-686). This program is open to all qualified students at the University of New Hampshire who have completed FREN 631-632, 651, and 652 by the end of their sophomore year. Early consultation with the director of the program is urged.

In addition to its summer school offerings at the Durham campus, the department sponsors a program at the Centre International d'Études des Langues (CIEL) in Brest, France, where students may enroll in courses equivalent to FREN 503, 504, 631, and 632. Students interested in this program should consult the program's on-campus director early spring semester.

Teaching Assistantship in France
Each year the French government offers a teaching assistantship in a French secondary school to a graduating French major nominated by the department. Applications are accepted during the fall semester.

Five-Year, Dual-Degree Program in French and Business Administration
The dual-degree program permits students who matriculate with business backgrounds to earn both a B.A. in French and an M.B.A. in five years instead of the normal six. Students must meet all requirements for both the French major and the M.B.A. program offered by the Whittemore School of Business and Economics. A maximum of 16 credits may be counted toward both degrees. Students interested in this program should consult with the departmental adviser to the program early in their freshman year.

Geography

(For descriptions of courses, see page 161.)

Geography is best defined as the discipline that describes and analyzes the variable character, from place to place, of the Earth as the home of human society. As such, geography is an integrating discipline, studying many aspects of the physical and cultural environment that are significant to understanding the character of areas or the spatial organization of the world.

Geography aims to provide students with a basis for understanding the world in which we live.

Because its integrating character establishes common areas of interest with many other fields of knowledge, geography provides an excellent core discipline for a liberal education. Those who would understand geography must also know something of the earth sciences, as well as economics, cultures, politics, and processes of historical development.

Students who have a strong interest in the spatial organization of the world and the distinctive character of its major regions and who also want a broad educational experience can achieve these goals effectively by majoring in geography.

Students with degrees in geography have found their education valuable in such fields as urban and regional planning, locational analysis for industry and marketing organizations, cartography, geographical information systems (GIS), library work, military intelligence, international studies, the Foreign Service, travel and tourism, and journalism.

Students planning careers as scholars or teachers in the field should concentrate their coursework in geography and appropriate related disciplines and should plan to go on to graduate study after completing an undergraduate major in geography. Students from this department have been admitted to first-rate graduate schools in all parts of the United States.

Students who major in geography are required to take ten courses with a minimum grade of C-.

A. All of the following core courses:
GEOG 401, Regional Geography of the Western World
GEOG 402, Regional Geography of the Non-Western World
GEOG 572, Physical Geography

B. One of the following regional courses:
GEOG 512, Geography of Canada
GEOG 513, Geography of United States
GEOG 531, Geography of Western Europe and Mediterranean
GEOG 540, Geography of Middle East
GEOG 541, Geography of Japan
GEOG 610, Geography of New England

C. Three of the following systematic courses:
GEOG 581, Human Geography
GEOG 582, Economic Geography
GEOG 583, Urban Geography
GEOG 584, Political Geography
GEOG 673, Environmental Geography
GEOG 685, Population and Development

D. One of the following physical courses:
GEOG 473, The Weather
GEOG 570, Climatology

E. One of the following technique courses:
GEOG 590, Cartography
NR 757, Photo Interpretation and Photogrammetry
NR 759, Digital Image Processing for Natural Resources

NR 760, Geographical Information Systems in Natural Resources

F. One elective course in geography:
This may be any geography course. However, students intending to continue to graduate school are strongly encouraged to take GEOG 795, Special Topics, and complete an undergraduate thesis.

A minor consists of five courses (20 credits) in geography with a minimum grade of C-.

Students interested in majoring or minoring in geography should consult with the supervisor, Alasdair Drysdale.

German

(For descriptions of courses, see page 162.)
The German major is offered by the Department of Languages, Literatures, and Cultures. This program is of interest to the following groups of students:

1. Those who have a special interest in the German language, literature, and culture.

2. Those who intend to enter fields in which a background in foreign languages and literatures is desirable, such as international business and law, trade, journalism, science, library science, government service, and international service organizations.

3. Those who plan to teach German in secondary schools. Since most secondary schools require their teachers to teach more than one subject, students planning to enter teaching at this level should plan their programs carefully. They should combine a major in one of the languages and its literature with a minor or at least a meaningful sequence of courses in another subject. Dual majors are also possible. For certification requirements, see the section coordinator.

4. Those who intend to pursue graduate study in German language and literature, cross-cultural studies, film, or women's studies, or foreign language education in preparation for teaching careers at the high school or university level.

A major consists of a minimum of 36 credits in German language, literature, and culture beyond GERM 503. No more than 8 of 36 credits may be taken in English toward the major (GERM 521 or 523; 525). Required for the major are GERM 504, 525, 601, 631, 632 (or their equivalents) and 16 other credits, 12 of which must be taken in Durham on the 600 and 700 levels. GERM 520 and 791 do not count for major credit (720 is the equivalent of 520 for majors); 791 is recommended as an elective and required for teacher certification. Majors are required to spend the minimum of one semester in an approved German-speaking study abroad program, or equivalent.

A minor consists of 20 credits in German courses numbered 503 and above. The minor may include one course taught in English (520, 521, 523, or 525) but not 791.

Study Abroad

(See also INCO 685, 686.) The University allows both German majors and minors and other students to attend approved study abroad programs for UNH credit. UNH is part of the New England Universities consortium (Maine, Vermont, Connecticut, and Rhode Island) which sponsors a program in Salzburg, Austria. UNH students get a discount on Salzburg Program tuition and have an easy transferal of credits. Students may also attend other programs, for example, a work-study term in Hamburg, or semester or year programs at universities such as Bonn, Freiburg, Heidelberg, Marburg, Munich, or Tübingen. UNH also sponsors a summer program in Berlin (see GERM 625, 626). Most programs require a minimum of two years of college German. For intensive language study at any level, students may attend Goethe-Institut centers in Germany for one or more eight-week courses. For details, see the foreign study coordinator, Center for International Education, or the German coordinator. Financial aid applies to all approved programs.

Greek

(For descriptions of courses, see page 164.)
The Greek major is offered by the classics program of the Department of Languages, Literatures, and Cultures. The coordinator is Richard V. Desrosiers.

The minimum requirements for a major in Greek are: 32 credits in Greek, including GREK 401-402. A Greek major must complete as a minimum a 700-level course in the Greek language. A Greek minor requires 20 credits of coursework in Greek. Students are encouraged to take courses in related fields such as Latin, classics, and ancient history, and to take part in overseas study programs in Greece.

History

(For descriptions of courses, see page 165.)
The study of history is an essential element of the liberal education. The history major provides both an awareness of the past and the tools to evaluate and express one's knowledge. The student who majors in history will have the opportunity to study the breadth of the human past and will acquire the skills in critical reading and writing which form the foundation of the educated life. The study of history may include all of human culture and society and provides tremendous latitude in the subjects which may be studied. The interdisciplinary nature of the field makes it a natural focus for study which may encompass a variety of other fields.

To complete a major in history, students must take ten 4-credit history courses or their equivalent. Students who enter the University as history majors and continuing students intending to declare a history major are considered "provisional majors" and are advised in the University Advising Center until they complete two history courses with a C- or better and have registered for HIST 500, Introduction to Historical Thinking. At that time students can confirm their major and be assigned a departmental adviser. We accord provisional majors all the rights and privileges of any history major. Majors must take HIST 500 and HIST 797, Colloquium in History. The colloquium is usually taken during your senior year. In addition to 500 and 797, a major must take at least eight courses, of which a minimum of three must be at the 600 level or above. Only one 695 independent study course may be used to fulfill the 600-level requirement, and no more than two independent study courses may count toward the ten-course requirement. No more than two 400-level courses may be counted toward the major requirements. Students must receive at least a C in HIST 500 and HIST 797, and at least a C- in the other eight courses. They must maintain a 2.00 or better in all history courses. General education courses offered by the department may be counted for major credit or for general education credit, but not for both.

A student's program of study must include two parts:

(1) An area of specialization. A student must select at least four courses to serve as an area of specialization within the major. Up to two courses (each 4 credits

or their equivalent) in the area of specialization may be taken in other departments; such courses must be 500 level or above and have the approval of the student's adviser. The area of specialization may be in a nation, region, a time period, or an interdisciplinary field.
(2) Complementary courses. A student must select, in consultation with his or her adviser, at least three history courses in fields outside the area of specialization, chosen to broaden his or her understanding of the range of history. Normally, each major should take at least one course from each of Groups I, II, and III, unless explicitly excused by the student's adviser.

The program must be planned in consultation with an adviser. A copy of the program, signed by one's adviser, must be placed in one's file no later than the second semester of one's junior year. Courses at the 700-level will be judged by the adviser as to their applicability for area of specialization or complementation. The program may be modified with the adviser's appproval.

For transfer students, a minimum of five of the semester courses used to fulfill the major requirements must be taken at the University. One upper-level course may be transferred to satisfy the requirement that a major must take at least three courses numbered 600 or above. Transfer students must complete both HIST 500 or its equivalent and HIST 797.

A minor in history consists of 20 semester credits with C– or better and at least a 2.00 grade-point average in courses that the Department of History approves. Courses taken on a pass/fail basis may not be used for the minor. No more than 12 credits in 400-level courses may be used for this minor. For transfer students, a minimum of two of the semester courses, or 8 credits, must be taken at the University of New Hampshire with a grade of C– or better.

Students intending further work in history beyond the bachelor's degree are urged to take HIST 775, Historical Methods.

Students intending to major in history should consult with the department secretary in Horton 405. Suggested programs for students with special interests or professional plans are available in the department office.

Undergraduate Awards for Majors

The Philip M. Marston Scholarship, an award of $500, is available to students who are interested in colonial or New England history and have demonstrated financial need. There are course requirements for this scholarship. More details are available from the history office.

The Ethyl Gerrish Scholarship, an award of $500, is available to students who are full-time and in their sophomore year or above. Applicants must be New Hampshire residents and have a grade-point average of 3.20. There are application guidelines for this scholarship. More details are available from the history office.

Each spring the members of the departmental undergraduate committee choose one major to receive the William Greenleaf Prize in History. Award candidates must have a minimum grade-point average of 3.20 in history courses and must submit a major paper completed for a history course or written specifically for this award. Individuals may nominate themselves or may be nominated by faculty members.

The Allen Linden Prize for the best senior history thesis is funded by the Signal Fund.

Phi Alpha Theta, the history honor society, is an international scholastic organization dedicated to promoting historical study on the undergraduate and graduate levels. Admission to the UNH Psi Pi chapter is open to undergraduates with an overall grade-point average of 3.20 and a grade-point average of 3.20 or better in history courses.

Humanities

(For descriptions of courses, see page 171.)

The humanities program examines the fundamental questions and issues of Western civilization. Through studying diverse texts in the arts, music, literature, history, philosophy, and science, students seek answers to questions that thoughtful human beings often address in the course of their lives. Whether these questions come from Socrates (What is justice?), from Sir Thomas More (What is obligation to God?), from Raphael (What is beauty?), from Newton (What are the laws of nature?), or from Martin Luther King, Jr. (What is freedom?), they direct our attention to enduring human concerns and to texts that have suggested or illustrated the most profound and powerful answers.

Humanities Major

The humanities major consists of a minimum of 40 credits of academic work, with a minimum grade of C, including the following core requirements:

1. Critical Methods in the Humanities (HUMA 500)

2. Integrated Core Courses (HUMA 501, 502, 503, *or* 510, 511, 512, 513, 515). Each student takes at least two courses (8 credits) from the 501/502/503 sequence or at least two courses (8 credits) from the 510/511/512/513 sequence, preferably in the freshman and/or sophomore year.

3. Seminar in the Humanities (HUMA 700). Each student takes at least one offering (4 credits) of the Seminar in the Humanities, preferably before the end of the junior year. This seminar provides an opportunity for in-depth reading, viewing, and/or listening to texts and artifacts. The emphasis is on the multiple perspectives and methodologies that can be brought to bear upon these works from several humanistic disciplines.

4. Research Seminar in the Humanities (HUMA 798/799). Each student participates in the research seminar (for a total of 4 credits) in the senior year. The seminar provides a context within which students may discuss and receive directions in the course of completing a major research paper. At the end of the second seminar, students present their research to the faculty and their fellow students.

5. Additional Requirements. Beyond the 16 credits of core requirements, each student must fulfill the following requirements: (1) a minimum of 8 additional credits in 600-level humanities program courses; (2) an additional 12 credits from humanities program offerings or from the offerings of other departments and programs, with the advice and approval of each student's major adviser or the program coordinator. These offerings should bear some relation to the student's particular interests and senior research paper, as seem appropriate in each individual case.

Humanities Minor

The humanities minor consists of the following courses: (1) two courses from either the 501/502/503 sequence or the 510/511/512/513/515 sequence; (2) two 600-level humanities courses; and (3) either Critical Methods in the Humanities

or Seminar in the Humanities. (For a more complete description of the humanities minor, see page 29.)

Inquiries about the humanities major and minor should be directed to David Richman, coordinator of the Humanities Program, 2 Murkland Hall.

Latin

(For descriptions of courses, see page 178.)
The Latin major is offered by the classics section of the Department of Languages, Literature, and Cultures. The coordinator is Richard V. Desrosiers.

The minimum requirements for a major in Latin are 32 credits in Latin, excluding LATN 401-402. A Latin major must complete as a minimum a 700-level course in the Latin language. A Latin minor requires 20 credits of coursework in Latin. Students are encouraged to take courses in related fields such as Greek, classics, and ancient history, and to take part in overseas study programs in Italy.

Linguistics

(For descriptions of courses, see page 179.)
Linguistics is the study of one of the most important characteristics of human beings—language. It cuts across the boundaries between the sciences and the humanities. The program is an excellent liberal arts major or preprofessional major for education, law, medicine, clergy, and others. It is a particularly appropriate major for students who want to teach English as a foreign language. Dual majors with a foreign language, business administration, and the like, are quite feasible.

Students interested in the major or the minor should consult with the program coordinator or with any professor who teaches linguistics courses. To declare a major in linguistics, a student must meet with the linguistics coordinator to design a course of study. Information is available from the Advising Center, Hood House.

A minor in linguistics is also available and consists of any five linguistics courses approved by the linguistics coordinator.

Requirements for the Major

1. LING 505, Introduction to Linguistics
2. One course in historical linguistics: LING 506, Introduction to Comparative and Historical Linguistics; ENGL 752, History of the English Language; GERM 733, History and Structure of the German Language; RUSS 734, History and Development of the Russian Language; or SPAN 733, History of the Spanish Language
3. LING 605, Introduction to Linguistic Analysis
4. LING 793, Phonetics and Phonology
5. LING 794, Syntax and Semantic Theory
6. Two years college study (or equivalent) of one foreign language
7. One of the following cognate specialties:

(a) One year college study (or equivalent) of a second foreign language from a different language family or subfamily (Old English may count as the second foreign language if the first foreign language is not in the Germanic family);

(b) PSYC 712, Psychology of Language (with its prerequisite, either PSYC 512, Psychology of Primates, or PSYC 513, Cognitive Psychology);

(c) PHIL 745, Philosophy of Language (with its prerequisite PHIL 412, Beginning Logic, or PHIL 550, Logic);

(d) The following courses from the Department of Computer Science: CS 415-416: Introduction to Computer Science I and II; CS 730: Introduction to Artificial Language; CS 765, Introduction to Computational Linguistics.

8. Three elective courses from the list below:

Area Courses

Anthropology: 795, 796, Reading and Research in Anthropology· 8. Anthropological Linguistics.

Communication: 572, Language and Behavior, 672, Theories of Language and Discourse.

Communication Disorders: 522, The Acquisition of Language.

Computer Sciences: 765, Introduction to Computational Linguistics.

English: 715, TESL: Theory and Methods; 716, Curriculum Design, Materials, and Testing in English as a Second Language; 718, English Linguistics and Literature; 719, Sociolinguistics Survey; 752, History of the English Language; 778, Brain and Language; 779, Linguistic Field Methods; 790, Special Topics in Linguistic Theory; 791, English Grammar; 793, Phonetics and Phonology; 794, Syntax and Semantic Theory.

French, German, Greek, Latin, Russian, Spanish· 791, Methods of Foreign Language Teaching.

German· 733, History and Structure of the German Language

Latin: 795, 796, Special Studies in Latin.

Linguistics: 505, Introduction to Linguistics; 506, Introduction to Comparative and Historical Linguistics; 605, Introduction to Linguistic Analysis; 779, Linguistic Field Methods; 790, Special Topics in Linguistic Theory; 793, Phonetics and Phonology; 794, Syntax and Semantic Theory; 795, 796, Independent Study.

Philosophy· 550, Symbolic Logic; 618, Recent Anglo-American Philosophy; 650, Logic: Scope and Limits; 745, Philosophy of Language.

Psychology· 512, Psychology of Primates; 513, Cognitive Psychology; 712, Psychology of Language. (Students may count either PSYC 512 or 513 toward the linguistics major or minor, but not both.)

Russian: 734, History and Development of the Russian Language.

Sociology: 797F, Sociolinguistics.

Spanish: 601, Spanish Phonetics; 733, History of the Spanish Language; 790, Grammatical Structure of Spanish.

Other courses may be substituted, with the permission of the student's adviser and the Linguistics Committee, when they are pertinent to the needs of the student's program.

Music

(For descriptions of courses, see page 188.)
The Department of Music offers two degree programs: the bachelor of arts and the bachelor of music.

The Department of Music is a member of the National Association of Schools of Music. Prospective majors in music are advised to consult with the chair of the department.

Bachelor of Arts Program

The bachelor of arts program offers students an opportunity to major in music within the liberal arts curriculum. This program is intended for those who wish to pursue the serious study of music and to acquire at the same time a broad general education; it is recommended for those considering the five-year undergraduate-graduate program in teacher education or graduate study leading to the M.A. or Ph.D. degrees.

To be admitted formally to the B.A. program, students must give evidence of satisfactory musical training by taking an admission audition. Students must declare music as a major before the beginning of the junior year, but it is highly recommended that they declare as early as possible, considering the large number of required courses. Admission to the upper level of the degree program will be subject to review by the Department of Music faculty.

The bachelor of arts degree is offered with four options: music history, performance study, music theory, and preteaching. The B.A. may also be taken as a degree in music with no option specified. We refer to this as the undifferentiated B.A. in music. The following courses are required of all students: Theory I and Ear Training I (MUSI 471-472, 473-474), Theory II and Ear Training II (MUSI 571-572, 573-574), History and Literature of Music (MUSI 501-502), and one course from MUSI 771 (Counterpoint) or MUSI 781, 782 (Analysis: Form and Structure). Other requirements, grouped by option, are shown below.

Undifferentiated B.A. in Music

Any combination of advanced theory and history (15

credits); performance and/or ensemble study, any combination from MUSI 536-564 inclusive and/or MUSI 441-461 inclusive (8 credits).

Option 1, Music History
Advanced theory (3 credits); advanced history and literature (12 credits); performance study, any one of MUSI 536-564 inclusive (8 credits); ensemble study, any combination from MUSI 441-461 inclusive (4 credits); conducting, MUSI 731-732, (4 credits). Students must also demonstrate the ability to sight-read a Bach chorale harmonization.

Option 2, Music Theory
Advanced theory (12 credits); advanced history (3 credits); performance study, any one of MUSI 536-564 inclusive (8 credits); ensemble study, any combination from MUSI 441-461 inclusive (4 credits); conducting, MUSI 731-732 (4 credits). Students must also demonstrate the ability to sight-read a Bach chorale harmonization. The emphasis in this option is on musical composition and/or theory.

Option 3, Performance Study
Advanced theory or literature (3 credits); performance study, any one of MUSI 536-564 (16 credits—2 credits per semester); ensemble study, any combination from MUSI 441-461 inclusive (4 credits); conducting, MUSI 731-732 (4 credits). Qualified students may concentrate in voice, piano, strings, woodwinds, brass, or percussion. Those choosing voice must successfully complete, in addition to the B.A. foreign language requirement, one of the following course sequences: ITAL 401-402, GERM 401-402, FREN 401-402.

Option 4, Music Preteaching
EDUC 500; conducting, MUSI 731-732; orchestration, MUSI 779, techniques and methods (8 credits); ensemble study, any combination from MUSI 441-453 (8 credits); music history, any one of MUSI 701-717 (3 credits); performance study, any one of MUSI 536-564, 736-764 (8 credits); departmental piano proficiency exam. The music preteaching option is a part of the five-year graduate-undergraduate certification program (see page 34). The department also offers a four-year program leading to teacher certification, the bachelor of music with a major in music education.

For all the options listed above, but excluding the undifferentiated B.A. in music, a public performance is given during the senior year. For students in the music history option, this must be a lecture or lecture-recital; for those in performance study, a full recital; for students in the music theory option, a lecture, lecture-recital, or a recital including at least one original composition; for those in the preteaching option, a half recital is the minimum.

Bachelor of Music Program

The bachelor of music degree program is offered to students who wish to develop their talent in performance, composition, or music education to a high professional level. The program is recommended to those considering graduate study leading to the M.M. or D.M.A. degrees. The music education option is part of the undergraduate certification program (see page 36).

To be admitted to the B.M. program, students must demonstrate a high degree of musical competence or significant creative ability during an audition or examination. Selectivity is exercised as appropriate to the professional requirements of each programmatic option. Students must formally declare the B.M. as a degree program before the beginning of the sophomore year. Continuation into the upper level of the program is subject to review by the department faculty.

The bachelor of music curriculum offers concentration in the following areas, as detailed below: option 1, piano; option 2, organ; option 3, voice; option 4, strings, woodwinds, brass, or percussion; option 5, theory (composition); option 6, music education.

Students in music education must maintain a minimum 2.50 grade-point average in the option and have a 2.20 cumulative average at the time of application for student teaching (February 15 of junior year). Further, all music education students must have passed the departmental piano proficiency exam before their student-teaching semester. Techniques and methods courses must include MUED 545 (strings), 741 (choral), 747 (woodwinds), 749 (brass), and 751 (percussion).

A public performance is required during the senior year. For students in the performance options this must be a full recital; for those in theory, a lecture, lecture-recital, or a recital including at least one original composition; for those in music education, a half recital is a minimum.

The following shows a year-by-year breakdown of required courses for options 1–6.

Option 1, Piano
Freshman Year: general education requirements (4 courses, 16 credits); music theory and ear training: MUSI 471-472 (6 credits), MUSI 473-474 (2 credits); piano, MUSI 541 (6 credits); ensemble, any combination from MUSI 441-461 inclusive (2 credits). Total credits: 32.

Sophomore Year: general education requirements (4 courses, 16 credits); music theory and ear training: MUSI 571-572 (6 credits), MUSI 573-574 (2 credits); piano, MUSI 541 (6 credits); ensemble, any combination from MUSI 441-461 inclusive (2 credits). Total credits: 32.

Junior Year: general education requirements (2 courses, 8 credits); music history, MUSI 501-502 (6 credits); counterpoint, MUSI 771-772 (4 credits); piano, MUSI 741 (6 credits); ensemble, any combination from MUSI 441-461 inclusive (2 credits); piano methods, MUED 743 (2 credits); one elective course outside the department (4 credits). Total credits: 32.

Senior Year: piano, MUSI 741 (7 credits); ensemble, MUSI 455 (2 credits); advanced piano pedagogy, MUSI 795Y (2 credits); advanced history, MUSI 717 (3 credits); two 3-credit courses elected in advanced theory and literature (6 credits); conducting, MUSI 731-732 (4 credits); two 4-credit elective courses outside the department (8 credits). Total credits: 32.

Option 2, Organ
Freshman Year: general education requirements (4 courses, 16 credits); music theory and ear training: MUSI 471-472 (6 credits), MUSI 473-474 (2 credits); organ, MUSI 543 (6 credits); ensemble, any combination from MUSI 441-461 inclusive (2 credits). Total credits: 32.

Sophomore Year: general education requirements (4 courses, 16 credits); music theory and ear training MUSI 571-572 (6 credits), MUSI 573-574 (2 credits); organ, MUSI 543 (6 credits); ensemble, any combination from MUSI 441-461 inclusive (2 credits). Total credits: 32.

Junior Year: general education requirements (2 courses, 8 credits); music history, MUSI 501-502 (6 credits); MUSI 771-772 (4 credits); organ, MUSI 743 (6 credits); ensemble, any combination from MUSI 441-461 inclusive (2 credits); voice class, MUED 540 (2 credits); choral methods, MUED 741 (2 credits); one elective course outside the department (4 credits). Total credits: 34.

Senior Year: organ, MUSI 743 (7 credits); ensemble, any combination from MUSI 441-461 inclusive (2 credits); advanced piano pedagogy, MUSI 795Y (2 credits); one course in liturgical music, organ literature, repertoire, or hymnology (3 credits); two 3-credit courses elected in advanced theory and literature (6 credits); conducting, MUSI 731-732 (4 credits); elective courses outside the department (6 credits). Total credits: 30.

Option 3, Voice
Freshman Year: general education requirements (4 courses, 16 credits); music theory and ear training MUSI 471-472 (6 credits), MUSI 473-474 (2 credits); voice, MUSI 545 (6 credits); piano, MUSI 541 (2 credits); choral and/or vocal ensemble, any combination from MUSI 441,442, 443, 448, 461 inclusive (2 credits). Total credits: 34

Sophomore Year: general education requirements (4 courses, 16 credits)— the group 5 general education requirements must be satisfied with a foreign language; music theory and ear training: MUSI 571-572 (6 credits), MUSI 573-574 (2 credits); voice, MUSI 545 (6 credits); piano, MUSI 541 (2 credits); choral and/or vocal ensemble, any combination from MUSI 441,442, 443, 448, 461 inclusive (2 credits). Total credits: 34

Junior Year: general education requirements (2 courses,

8 credits); a second foreign language: German, French, or Italian (8 credits); music history, MUSI 501-502 (6 credits); voice, MUSI 745 (6 credits); piano, MUSI 741, (2 credits); choral and/or vocal ensemble, any combination from MUSI 441,442, 443, 448, 461 inclusive (2 credits); choral methods, MUED 741-742 (4 credits). Total credits: 36.

Senior Year: voice, MUSI 745 (7 credits); piano, MUSI 741 (2 credits); ensemble, any combination from MUSI 441-461 inclusive (2 credits); advanced history, one course from MUSI 713 or MUSI 715 (3 credits); advanced theory, one course from MUSI 771 (2 credits), 781, or 782 (3 credits); two other 3-credit courses elected in advanced theory or literature (6 credits); conducting, MUSI 731-732 (4 credits). Total credits: 26.

Option 4, Strings, woodwinds, brass, or percussion
Freshman Year: general education requirements (4 courses, 16 credits); music theory and ear training: MUSI 471-472 (6 credits), MUSI 473-474 (2 credits); performance study at "500 level" on major instrument (6 credits); piano, MUSI 541 or 467 (2 credits); instrumental ensemble, a combination from MUSI 450, 452, 453, 456, 457, 458, or 459 (2 credits). Total credits: 34

Sophomore Year: general education requirements (4 courses, 16 credits); music theory and ear training: MUSI 571-572 (6 credits), MUSI 573-574 (2 credits); performance study at "500 level" on major instrument (6 credits); piano, MUSI 541 or 467 (2 credits); instrumental ensemble, a combination from MUSI 450, 452, 453, 456, 457, 458, or 459 (2 credits). Total credits: 34

Junior Year: general education requirements (2 courses, 8 credits); music history, MUSI 501-502 (6 credits); conducting, MUSI 731-732 (4 credits); performance study at "700 level" on major instrument (6 credits); instrumental ensemble, a combination from MUSI 450, 452, 453, 456, 457, 458, or 459 (4 credits); one instrumental methods course selected from MUED 545-546, 747-748, 749,751 (2 credits). Total credits: 30.

Senior Year: performance study at "700 level" on major instrument (7 credits); instrumental ensemble, a combination from MUSI 450, 452, 453, 456, 457, 458, or 459 (4 credits); one instrumental methods course selected from MUED 545-546, 747-748, 749,751 (2 credits); advanced theory, one course from MUSI 771 (2 credits), 781, or 782 (3 credits); two other 3-credit courses elected in advanced theory or literature (6 credits); two 4-credit courses elected outside the Department of Music (8 credits). Total credits: 30.

Option 5, Theory (Composition)
Freshman Year: general education requirements (4 courses, 16 credits); music theory and ear training: MUSI 471-472 (6 credits), MUSI 473-474 (2 credits); performance study at "500 level" on major instrument (2 credits); performance study: brass (1 credit) and woodwind (1 credit) or techniques and methods (2 credits); piano, MUSI 541 (2 credits); ensemble, any combination from MUSI 441-461 inclusive (2 credits). Total credits: 32.

Sophomore Year: general education requirements (4 courses, 16 credits); music theory and ear training: MUSI 571-572 (6 credits), MUSI 573-574 (2 credits); music history, MUSI 501-502 (6 credits); performance study at "500 level" on major instrument (2 credits); piano, MUSI 541 (2 credits); ensemble, any combination from MUSI 441-461 inclusive (2 credits). Total credits: 36.

Junior Year: general education requirements (2 courses, 8 credits); counterpoint, MUSI 771-772 (4 credits); composition, MUSI 775-776 (6 credits); orchestration, MUSI 779 (3 credits); analysis, MUSI 781, 782 (6 credits); performance study at "700 level" on major instrument (2 credits); piano, MUSI 741 (2 credits); ensemble, any combination from MUSI 441-461 inclusive (2 credits). Total credits: 33.

Senior Year: advanced counterpoint, MUSI 773 (2 credits); advanced composition, MUSI 777 (6 credits); piano, MUSI 741 (2 credits); two 3-credit courses in music literature (6 credits); ensemble, any combination from MUSI 441-461 inclusive (2 credits); performance study at "700 level" in major instrument (2 credits); performance study: strings (1 credit) and percussion (1 credit) or techniques and methods (2 credits); conducting, MUSI 731 (2 credits).Total credits: 24

Option 6, Music Education*
Freshman Year: general education requirements (4 courses, 16 credits); techniques and methods: string, MUED 545 (2 credits) and percussion, MUED 751 (2 credits); music theory and ear training: MUSI 471-472 (6 credits), MUSI 473-474 (2 credits); performance study at the "500 level" on major instrument (1 credit per semester); piano, MUSI 467 or 541 (1 credit/semester); ensemble, any combination from MUSI 441-461 inclusive (2 credits). Total credits: 34

Sophomore Year. general education requirements (1 course, 4 credits); EDUC 500** (4 credits); techniques and methods: woodwind, MUED 747 (2 credits) and brass, MUED 749 (2 credits); music theory and ear training: MUSI 571-572 (6 credits), MUSI 573-574 (2 credits); music history, MUSI 501-502 (6 credits); piano, MUSI 467 or 542 (1 credit/semester); performance study at the "500 level" in major instrument (1 credit/semester); ensemble, any combination from MUSI 441-461 inclusive (3 credits). Total credits: 33.

Junior Year. general education requirements (3 courses, 12 credits); education, EDUC 700-701 (8 credits); elementary music education, MUED 790 (3 credits); techniques and methods, choral, MUED 741 (2 credits); orchestration, MUSI 779 (3 credits); conducting, MUSI 731-732 (4 credits); performance study at "700 level" in major instrument (1 credit/semester); ensemble, any combination from MUSI 441-461 inclusive (2 credits). Total credits: 36.

Senior Year: general education requirements (1 course, 4 credits); education, EDUC 705 (2 credits); student teaching, EDUC 694 (8 credits); music education seminar, MUED 792 (2 credits); secondary music education, MUED 791 (3 credits); music history, one course from 701-717 (3 credits); music theory: one course from MUSI 771 (Counterpoint, 2 credits) or MUSI 781, 782 (Analysis: Form and Structure, 3 credits); performance study at "700 level" in major instrument and senior recital (2 credits); ensemble, any one from MUSI 441-461 inclusive (1 credit). Total credits: 28.

*Music education electives may include MUED 742, choral techniques II (2 credits); MUED 748, double reeds (2 credits); and MUED 795, Special Studies: Jazz Techniques or Marching Band Techniques (2 credits).

** EDUC 500 may be taken either semester of the second year. However, the music education methods course that covers the student's major instrument should be taken prior to enrolling in EDUC 500.

Minor in Music

All students minoring in music must complete a minimum of 20 credits of coursework in music, of which the following are required: MUSI 471-472, MUSI 473-474, MUSI 501-502. MUSI 411-412 may be substituted for MUSI 471-472 and MUSI 473-474.

Philosophy

(For descriptions of courses, see page 196. Each semester, detailed course descriptions are posted in the department office and on the department Web page: http://www.unh.edu/philosophy/)

Philosophy has always been the heart of liberal education, deepening and enriching the lives of those who pursue it. The philosophy major provides students with the opportunity to confront a wide variety of questions, especially those that cannot be dealt with in the framework of other disciplines. Such questions include those about the ultimate nature of reality: Does God exist? Are minds distinct from bodies? Are there more things between heaven and earth than are dreamt of in science? Other questions probe what it is to know: Do we know that material bodies external to our minds exist? What does it mean to justify a belief? Still other questions are about how we ought to act: What is a good person? Are there moral rules? How are they justified? Must we obey them?

Philosophy also concerns itself with other disciplines: What makes something a work of art? What distinguishes a scientific theory from a religious theory or myth? Is capitalism amoral? Is abortion morally permissible? Should women ever be treated differently from men?

The Philosophy Department offers a wide range of courses exposing students to the full scope of philosophical activity. Grappling with major primary texts from the history of philosophy is an important emphasis of the program, for philosophy today is the continuation of a conversation that extends back to the Ancient

Greeks and the Vedic Scriptures. Philosophy has also always wrestled with cutting-edge topics emerging in the current culture. Some recent examples are: What are the prospects for machines with mental lives? What are the implications of new views in cosmology? How do we handle the pressing ethical dilemmas brought on by emerging medical technologies, or by the historically unparalleled rate of destruction of the Earth's environment? Are gender and race socially constructed concepts rather than biological concepts?

Career Opportunities
Philosophy offers excellent training for a variety of careers by providing a unique combination of life-long skills: analytic and interpretive skills, critical reasoning skills, the enhanced capacity to detect problems and to solve them, excellence in oral and written presentation and defense of one's ideas, skill at asking probing and central questions about the ideas of others (as well as about one's own ideas), skill at effectively understanding, organizing and evaluating complex systems of thought.

Considering these skills, it is not surprising that philosophy majors score in the very top percentiles on the GRE, LSAT, and GMAT standardized exams. For example, in a recent GRE study, philosophy majors were ranked among the very top majors in their mean scores on the verbal, analytic, and quantitative components of the exam; in a recent LSAT study, philosophy majors had a higher mean score than even pre-law majors; and for recent GMAT tests, the mean score for philosophy majors exceeded that of any type of business major. Virtually no other major does this well on such a wide cross-section of standardized exams.

These results reflect the fact that the unique combination of skills acquired in philosophy, along with the breadth of subject matter reflected on in philosophy, provide the philosophy major with an extremely adaptive and resilient mindset. This is especially valuable in an era where all predictions indicate that repeated career change will be the norm rather than the exception for professionals. Philosophy provides superior preparation for a variety of vocational and professional endeavors, and perhaps more importantly, for being a professional.

The Philosophy Major
The following courses constitute a core required of all majors: PHIL 412, 500, 530, 570, 574, 575. Majors must take a total of ten philosophy courses. Majors must take at least two courses at the 700 level and at most two courses (including 412) at the 400 level. At least one course must concentrate on major works of twentieth-century continental philosophy, and at least one course must concentrate on major works of twentieth-century Anglo-American philosophy. Courses used to satisfy requirements for the major may be used to satisfy general education requirements. PHIL 495, 795, and 796 normally do not count toward fulfilling major requirement credits; exceptions may be granted by special permission.

Special-Interest Program
Students may add to the above major a special-interest program of value in planning for postgraduate education or entry into such areas as law, medicine, business, education, theology, or social work. Special advisers are prepared to provide informal counsel to philosophy majors interested in these areas.

Graduate Preparatory Emphasis
This emphasis is strongly recommended for students who plan to do graduate work in philosophy. Beyond the ten program courses, such students should select, with their advisers' approval, two additional philosophy courses above the 400 level, for a total of twelve courses. One of these should be PHIL 550.

Departmental Commendation
Students accepted for departmental commendation will register for PHIL 699 (usually during the second semester of the senior year) and will write, under the guidance of an adviser, an original paper in philosophy. If completed successfully, students will receive a letter of commendation.

Philosophy Minor
Any five philosophy courses constitute a minor (PHIL 495, 795, 796 with special approval only).

Five-Year, Dual-Degree Program in Philosophy and Business Administration
The dual-degree program permits students to earn both a B.A. in philosophy and an M.B.A. in five years instead of the normal six. Students must meet all requirements for both the philosophy major and the M.B.A. program offered by the Whittemore School of Business and Economics. A maximum of 16 credits may be counted toward both degrees. Students interested in this program should consult the departmental adviser to the program early in their sophomore year.

Political Science

(For descriptions of courses, see page 201.)
The study of government and politics, to which the courses and seminars of the Department of Political Science are devoted, includes the development of knowledge of political behavior by individuals and groups as well as knowledge about governments: their nature and functions; their problems and behavior; and their interactions—at the national and international levels and at the local, state, and regional levels.

Much of the learning offered by the Department of Political Science can also be regarded as essential for good citizenship, since political knowledge helps to explain both the formal institutions by which societies are governed and the issues that encourage people toward political interest and political action. In addition, such learning is especially valuable to students planning to enter local or national government or other public service, including Foreign Service, and it will be of great help to those who intend to study law and enter the legal profession. For teaching, particularly at the college level, and for many types of government service, graduate work may be indispensable. An undergraduate major in political science will provide the most helpful foundation for further study in the field. Such an emphasis will also be valuable for students seeking careers in journalism, international organizations, and the public affairs and administrative aspects of labor, financial, and business organizations.

The major program in political science consists of at least nine courses (36 credits) and not more than twelve courses (48 credits) to be distributed in the following way:

1. Two 400-level courses. These introductory courses should be completed by majors by the end of the sophomore year.

2. Six 500- and/or 600-level courses. Of these, at least one shall be chosen from each of the four fields in which the department's courses are organized: American politics, political thought, com-

parative politics, and international politics.

3. One 700-level course.

The Department of Political Science will not allow the use of 400-level courses to "double count" as a major requirement and a general education requirement. However, if a student has successfully completed three or more 400-level courses, special permission can be obtained to use one of the 400-level introductory political science courses as a general education requirement.

Minor in Political Science

The political science minor consists of five courses (20 credits total). These courses may be taken in any combination of the four fields and levels (400–700) offered. The fields to choose from are: American politics, political thought, comparative politics, and international politics. It is recommended that no more than two courses be taken at the 400 level.

The minimum grade requirement is C– per course. Any grade lower than a C– will not count toward the minor. Students wishing to use transfer credits from abroad or other universities should meet with a political science adviser to determine eligibility toward the minor.

Internships and Advanced Study

In addition to the courses regularly offered, the department will have available selected topics, advanced study in political science, and internships. Interested students should check with the department office to learn of the offerings for a given semester.

The department also offers several internship opportunities giving students experience in various aspects of government, policy making, and the legal system at the local, state, and national levels. Students need not be political science majors, but a student must have taken certain course prerequisites for each kind of internship. In addition, students must have junior or senior standing and normally have a 3.00 average or higher to be eligible for consideration. Washington placements are made either through the Department of Political Science or through the Washington Center located in the WSBE Dean's office; major credit must be arranged through the department.

Psychology

(For descriptions of courses, see page 204.)

The psychology major provides students with a broad education, while also allowing some specialization. The program exposes students to the scientific study of behavior and encourages an increased understanding of the behavior of humans and animals.

Students who wish to declare psychology as a major after enrolling in the University should consult with the department's academic counselor for application procedures and criteria.

Students majoring in psychology must complete 44 credits with a minimum grade of C– in each course and a 2.00 overall average in all major requirements. Students with a first major in psychology may not use any psychology courses to fulfill general education requirements. The distribution of the major requirements is as follows:

A. Three core courses—PSYC 401, 402, and 502.

B. Four breadth (500-level) courses as follows:

Group I: two courses from two different tracks:

Cognitive track: PSYC 512 or 513
Behavioral track: PSYC 521 or 522
Biological/Sensory track: PSYC 531

Group II: Two courses from two different tracks:

Social/Personality track: PSYC 552 or 553
Abnormal/Counseling track: PSYC 561
History track: PSYC 571
Developmental track: PSYC 581 or 582

C. Three depth (700-level) courses as follows:

Group I: one from any track:

Cognitive track: PSYC 712, 713, 7418
Behavioral track: PSYC 721, 732, 741C
Biological/Sensory track: PSYC 710, 711, 731, 733, 735, 737, 741D
General track: PSYC 741A

Group II: one course from any track.

Social/Personality track: PSYC 704, 752, 755, 758, 791B, 791C
Abnormal/ Counseling track: PSYC 762, 793, 791D
History track: PSYC 770, 771, 791E
Developmental track: PSYC 780, 783, 785, 791F, 791G
General track: 791A

The third 700-level course may be any additional 700-level course numbered 702–793.

D. One Psychology elective that can be any 500- or 700-level course offered by the psychology department (4 credit minimum; letter grade required; no pass/fail or credit/fail courses).

Note: Most offerings have one or more prerequisite courses. Students (with the help of their advisers) are expected to select breadth courses that will later enable them to select depth courses appropriate to their interests and career goals.

Transfer students who elect to major in psychology must complete at least 24 credits in the program at UNH to qualify for the degree in psychology. Transfer students must earn a total of 44 approved credits for completion of the psychology major. The distribution of these credits will be determined by the department's academic counselor. Transfer students should note that courses are allotted only the number of credits granted by the original institution (after adjustments for semester-hour equivalents). Thus, students transferring from an institution at which courses carry less than 4 credits each must make up for any credit deficit created by acceptance of transfer credits into the psychology major.

Specific course selections should be discussed with advisers. Exceptions to the requirements for the major require a petition to the department.

Psychology majors planning to go on to graduate study in psychology are advised to include PSYC 702 and/or 705 among their courses.

The minor in psychology consists of five psychology department courses (20 credits), including PSYC 401. No more than 4 credits of PSYC 795 may be applied to the minor. A maximum of 12 psychology transfer credits can be applied to the psychology minor at UNH.

See the department secretary for further details on the major or minor in psychology.

Advising System

Students who enter the University as psychology majors are considered "provisional majors" and are advised in the University Advising Center until they complete PSYC 401 and 402, at which time they can confirm their major. "Provisional majors" are accorded all the rights and privileges of any psychology major. Undergraduate advising in the department is conducted jointly by the department's academic counselor and the full-time faculty. The academic counselor has primary responsibility for advising confirmed and newly declared freshman and sophomore psychology majors and is the initial contact for all majors in a state of transition (readmitted, transfer, newly declared students, etc.). The academic counselor assists students in all phases of educational planning and decision making, including preregistration, long-range academic planning, degree and program requirements, and career selection and planning. Junior and senior psychology majors are assigned to a faculty adviser

with appropriate consideration for student preferences. The advising relationship with a faculty member is designed to encourage refining career and educational decisions.

Five-Year, Dual-Degree Program in Psychology and Business Administration
The dual-degree program permits students to earn both a B.A. in psychology and an M.B.A. in five years instead of the normal six. Students must meet all requirements for both the psychology major and the M.B.A. program offered by the Whittemore School of Business and Economics. A maximum of 16 credits may be counted toward both degrees. Candidates for the five-year, dual-degree program typically have a background of work experience in addition to a solid academic record. Students interested in this program should consult with the departmental adviser to the program early in their sophomore year.

Undergraduate Awards for Majors
Each year the faculty chooses psychology undergraduates as the recipients of the following awards: the Herbert A. Carroll Award for an outstanding senior in psychology, the George M. Haslerud Award for an outstanding junior in psychology, and the Fuller Foundation Scholarship for an outstanding junior in psychology with demonstrated interests in clinical psychology. Psychology majors with at least a 3.20 grade-point average are eligible for these awards. Faculty nominate students from the eligibility list and final selection of recipients is made by vote of the full-time psychology faculty.

Honors Program in Psychology
The Department of Psychology sponsors an honors program for outstanding students in the major. Students may apply to the honors program in psychology in their sophomore or junior year. Eligibility criteria include:

1. Overall G.P.A. of 3.20 or above
2. Completion of PSYC 401, 402, and 502 with a grade of B or above in each

Requirements of the program include:

1. Three 700-level psychology honors courses or equivalent
2. PSYC 797, Senior Honors Tutorial (fall)
3. PSYC 799, Senior Honors Thesis (spring)

Students interested in applying to the honors program should contact the department's academic counselor.

Undergraduate Research Conference
The Department of Psychology sponsors the annual George M. Haslerud Undergraduate Research Conference each spring. Undergraduates are invited to submit empirical or theoretical papers for presentation at the conference. Contact the department's academic counselor for more information.

Russian

(For descriptions of courses, see page 208.)
The Russian major provides students with an opportunity to study one of the world's most important languages, its culture, and its literature. In addition to the intrinsic value of Russian as a liberal arts experience, the Russian major leads to a number of careers, such as teaching, translation and interpreting, government, and foreign service. It is also a valuable asset in preparing for careers in law, economics, and international trade, and it can serve as a dual major with business administration, international affairs, the natural and physical sciences, and other liberal arts fields such as English, history, political science, sociology, philosophy, theatre, communication, linguistics, and other foreign languages.

The Russian major consists of a minimum of 40 credits above RUSS 504. Specific course requirements are RUSS 425, 521, 522, 601, 631-632, 691, 693, 733, and 734. Majors are strongly encouraged to spend a semester or summer on an approved study abroad program in Russia.

The minor in Russian consists of a minimum of 20 credits above RUSS 402 and must include RUSS 503-504 and RUSS 631-632, 691, or 733.

Students wishing to major in Russian should contact Arna Bronstein in 12 Murkland Hall.

Russian Studies Minor
The Russian studies minor offers students an opportunity to pursue area study of Russia and the new states through an interdisciplinary program. The minor consists of a minimum of 20 credits (5 courses) with a minimum grade of C. In addition to the required courses and electives, students must demonstrate a Russian language proficiency at the level of RUSS 504 or an equivalent.

Students wishing to minor in Russian studies should consult with any faculty member in Russian studies.

Sociology

(For descriptions of courses, see page 210.)
Sociology involves the study of human beings in social contexts. Sociologists examine the ways in which social relationships among individuals, groups, and organizations are created and maintained. They also study the causes and consequences of change in the social world.

Students who major in sociology may study socialization, social psychology, deviance and social control, formal organizations, equality and inequality within society, and social structure. Specific phenomena are also studied, including the family, health and illness, gender, race and ethnic relations, social policy, and criminology. Sociology majors should learn skills in methods of social research, statistical analysis, and sociological theory.

Majors must complete a minimum of 40 semester credits with grades of C– or better in each of these courses and a grade-point average of 2.00 or better in sociology courses. SOC 400, 502 (or acceptable substitutes), 599, 601, and 611 or 612 are required. At least three of the additional major courses must be at the 600 or 700 level (excluding 795 or 796). SOC 599 must be completed no later than the junior year and is a pre- or corequisite for majors taking 600- and 700-level courses.

It is possible to select a concentration within the major by taking electives in a specific area, such as medical sociology or criminal justice. Conjoint minors (allowing double-counting of one or two courses) are available for justice studies; gerontology; American studies; African-American studies; race, culture, and power; and women's studies, etc. There is also the possibility of second majors (with the same double-counting provision). Students interested in social work or in high school teaching can develop programs in conjunction with the appropriate departments. The departmental honors program is recommended for students with cumulative grade-point averages over 3.20, and especially for those anticipating graduate study.

Students interested in majoring in sociology should consult with the chairperson of the Sociology Committee for Undergraduate Studies for guidance. It is the responsibility of all sociology majors to obtain the latest information from the department office.

A minor consists of any five 4-credit courses in sociology with a C– or better in each course and a grade-point average of 2.00 or better in such courses.

Spanish

(For descriptions of courses, see page 212.)

The major in Spanish is offered by the Department of Languages, Literatures, and Cultures. It is designed for students who wish to acquaint themselves more thoroughly with the language, culture, and literature of the Spanish-speaking peoples. In addition, the department offers courses in Portuguese.

Students who major in Spanish may prepare themselves for a variety of fields in which proficiency in the Spanish language and knowledge of Hispanic cultures are desirable. Such fields might include international relations, business administration, government work, social service, and communications. In addition, students can prepare to teach Spanish at the elementary and secondary levels and in bilingual education programs through the foreign language teacher education program. The undergraduate major also provides a basis for graduate study in preparation for scholarly research and teaching at the college level. When combined with coursework or a dual major in other disciplines, the major prepares students for work in Spanish-speaking areas of the world as well as in bilingual regions of the United States.

The UNH study abroad program in Granada, Spain, open to majors and nonmajors, offers students the opportunity to live and study abroad for a semester or a full academic year. Financial aid is available for eligible students. Contact the departmental program directors for further information.

The major consists of a minimum of 40 credits. All coursework required for the Spanish major or minor must be completed with a grade of C or better. Specific course requirements are (1) language and culture: 525 or 526, 601, 631, and 632; (2) introductory literature: 650, and either the sequence 651/652 or 653/654; (3) three courses taught in Spanish at the 700 level. An approved foreign study experience in a Spanish-speaking country of a minimum of one semester is required; a full academic year is highly recommended. The Spanish minor consists of 20 credits above 501, including 631 and 632.

For more information on the major, the minor, and options for the study abroad experience, please see the chair of Spanish or the Spanish undergraduate advising coordinator.

Theatre and Dance

(For descriptions of courses, see page 214.)

The theatre program offers a variety of opportunities to students interested in the performing arts. During a four-year period, the Department of Theatre and Dance offers a range of productions in a variety of styles. Because the department concentrates on undergraduate education, the students have many opportunities to perform, design, choreograph, and direct during their four-year period. Faculty contacts with area theatres, touring, and stock companies afford off-campus experiences in the junior and senior years.

The theatre major emphasizes the strengths of general theatre training within a broad liberal arts context, with opportunities for specialization in acting, directing, teaching, choreography, design and technical theatre, play writing, youth drama, storytelling, puppetry, secondary school certification, ballet, theatre (jazz and tap) dance, musical theatre, and touring theatre, not to mention the possibility for integration with other departments. Students interested in performance, technical, and historical aspects will find opportunities for personal and preprofessional growth. The program affords means for independent study and internships, special projects, and for active personal involvement in lecture and laboratory classes.

In addition to general liberal arts preparation, six specific course sequences are available within the theatre major: (1) courses leading to a major that when combined with requirements of the Department of Education qualify students for secondary school certification; (2) courses leading to a major that when combined with requirements of the Department of Education prepare students for elementary school certification with an undergraduate specialization in youth drama; (3) courses leading to a theatre major with an emphasis in dance (ballet, tap and jazz, and theatre dance); (4) courses leading to a theatre major with an emphasis in musical theatre; (5) courses leading to a theatre major with an emphasis in design and technical theatre; and (6) courses leading to a theatre major with an emphasis in performance.

The basic theatre major allows students to explore a variety of areas. In the freshman and sophomore years, the student should enroll for at least two theatre courses per semester and two general education courses per semester. Students meet with the chair of the department, until the junior year when advisers are assigned appropriate to the individual's area of interest.

The General Major in Theatre

The Major in Theatre at UNH, as stated, emphasizes the strengths of general theatre training within a broad liberal arts context, with opportunity for specialization and individual development.

Theatre (B.A.)

Course and Major Requirement Sequence

I. Required

THDA 435, Introduction to Theatre; 436 or 438, History of Theatre I or II; 459, Stagecraft; 551, Acting I; 653 or 654, Performance Project/Scenic Arts; 653 or 654, Performance Project/Scenic Arts; 689 A-D, Theatre/Dance Practicum; 798, Senior Seminar.

II. 4 Credits from Theory/History

THDA 450, History of Musical Theatre in America; 520, Creative Drama; 541, Arts and Theatre Management, 621, Education through Dramatization; 627, Methods of Education Through Dramatization; 632, Interpretation of Shakespeare in the Theatre; 657, Play Reading; 750, Writing for Performance (Playwriting).

III. 4 Credits from Design/Technical

THDA 458 Costume Construction; 475, Stage Make-Up; 532, The London Experience; 546, Costume Design for the Theatre; 547, Stage Properties; 548, Stage Lighting Design and Execution; 583, Introductory to Puppetry; 641, Stage Management; 683, Advanced Puppetry; 650, Scene Painting for the Theatre; 651, Rendering for Theatre; 652, Scene Design.

IV. 4 Credits from Performance

THDA 457, Introduction to Movement and Vocal Production; CRTHDA 470, Movement and Vocal Production; CRTHDA 552, Acting II; CRTHDA 555, Exploring Musical Theatre; CRTHDA 592A, Special Topics; CRTHDA 622, Storytelling, Story Theatre, and Involvement Dramatics; CRTHDA 624, Musical and Theatre for Youth; CRTHDA 655, Musical Theatre Styles; CRTHDA 741, Directing; CRTHDA 755, Advanced Musical Theatre; CRTHDA 758, Acting III.

V. 8 Credits from any 600-800 Level Course, Including Those in Sections II, III, IV

THDA 691, Internship in Theatre and Dance; 781, Theatre Workshop for Teachers; 782, Advanced Theatre Workshop for Teachers; 795, Independent Study

Total: 48 cr.

The Secondary Teacher Emphasis in Theatre

High school theatre teachers are often responsible for directing plays and musicals (the latter in collaboration with a

music teacher). They must have a broad knowledge of all requisite theatre skills. Secondary theatre education certification is, in most states, combined with speech communication. Majors must also have a minor, or double major, in a traditional teaching discipline e.g., English, music, history, etc.

Theatre (B.A.)
Emphasis in Secondary Teacher Education

I. 48 credits from theatre area
THDA 435, Introduction to Theatre; 436 or 438, History of Theatre I or II; 459, Stagecraft, 520, Creative Drama, 551, Acting I; 555, Exploring Musical Theatre; 624, Theatre for Young Audiences; 627, Methods of Teaching Theatre; 653 or 654, Performance or Scenic Arts Project; 689, Theatre/Dance Practicum A-D; 741, Directing; 798, Senior Seminar.

II. 8 credits in speech communication
CMN 403, Public Speaking
CMN 455 Introduction to Mass Communication

III. 4 credits from education
EDUC 500, Exploring Teaching

Total: 58 cr.

It is understood that students involved in the above course curriculum must apply to either the UNH Department of Education or another university for acceptance into a fifth-year M.A.T. (Master of Arts in Teaching) degree and eventual certification.

The Youth Drama Emphasis in Theatre

Students considering a career in Elementary Education may be interested in an undergraduate specialization in Youth Drama. When coupled with a Master's Degree in Education, the student is well equipped to succeed in the classroom.

All of the graduates of this program in theatre are presently employed as teachers of elementary school-aged children. They believe that the theatrical and practical experience they obtained as undergraduates prepared them to obtain their teaching positions and for their classroom successes. The energy, concentration, and immediacy of the dramatic involvement seem to produce excellent results.

The course sequence for the major option in Youth Drama is included here.

Theatre (B.A.)
Emphasis in Theatre Education

I. Required of all students
THDA 435, Introduction to Theatre; 459, Stagecraft; 520, Creative Drama; 583, Introduction to Puppetry; 621, Education through Dramatization; 622, Storytelling, Story Theatre and Involvement Dramatics; 624, Theatre for Young Audiences; 653, Performance Project; 689 A-D, Theater/Dance Practicum; 798, Senior Seminar.

II. 4 credits from the dance area
Select THDA 463, Theatre Dance I

III. 4 credits in practicum
ED 500, Exploring Teaching

IV. Select 4 credits from education
ED 700, Educational Structure & Change
ED 701, Human Development & Learning
ED 703F, Teaching Science
ED 703M, Teaching Elementary Science & Social Studies
ED 705, Alternative Perspectives
ED 706, Introduction to Reading Instruction

V. Select 4 credits from mathematics
MATH 621, Number Systems for Teachers
MATH 622, Geometry for Teachers
MATH 623, Topics in Mathematics for Teachers
ED 703, Alternative Teaching Models
ED 706, Introduction to Reading Instruction
ED 741, Exploring Mathematics with Young Children

Total: 58 cr.

The Dance Emphasis in Theatre

The Department of Theatre and Dance offers a B.A. in Theatre with a Dance Emphasis in Ballet and Theatre (Tap/Jazz) Dance.

Theatre (B.A.)
Emphasis in Dance

I. Required of all students
THDA 435, Introduction to Theatre; 458, Costume Construction; 459, Stagecraft; 653 or 654, Performance Project/Scenic Arts; 689A, Theatre/Dance Practicum; 689B, Theatre/Dance Practicum; 689C, Theatre/Dance Practicum; 689D, Theatre/Dance Practicum; 798, Senior Seminar.

II. Select 8 credits from theory
THDA 487, The Dance; 586, Dance Pedagogy; 633, Dance Composition; 732 Choreography.

III. Select 8 credits from fine arts
THDA 546, Stage Costume Design; THDA 548, Stage Lighting Design; THDA 551, Acting I; THDA 555, Exploring Musical Theatre; THDA 655, Musical Theatre Styles; ARTS 431, Visual Studies; ARTS 572, Art of the Age of Humanism; ARTS 573, Art of the Modern World; MUSI 411-12, Fundamentals of Music Theory; MUSI 709, Music of the Romantic Period; MUSI 711, Music of the 20th Century; PHIL 421, Philosophy of the Arts.

IV. Select 16 credits from performance
THDA 461, Modern Dance I (as funding becomes available); 462, Ballet I; 562, Ballet II (may be repeated to 4 credits); 662, Ballet III (may be repeated); 463, Theatre Dance I; 563, Theatre Dance II (may be repeated to 4 credits); 663, Theatre Dance III (may be repeated); 684, Special Topics (Pedagogy); 576, Pointe; 597, Dance Theatre Performance (may be repeated).

Total: 52 cr.

The Musical Theatre Emphasis

A balanced program in Musical Theatre is offered as an emphasis within the Department of Theatre and Dance. This area of emphasis within the major focuses on dance, music, and theatre. It is assumed that students considering the Musical Theatre emphasis with have a certain amount of proven ability in at least one of the "triple threat" disciplines. After four years of study it is hoped that the student will have a solid background in: vocal techniques, and part singing (Usually obtained through choral work). Private lessons are available for a fee.

Theatre (B.A.)
Emphasis in Musical Theatre

I. Required of all students
THDA 435, Introduction to Theatre; MUSI 411, Fundamentals of Music Theory; THDA 450, History of Musical Theatre; THDA 459, Stagecraft; THDA 551, Acting I; THDA 555, Exploring Musical Theatre; THDA 653, Performance Project; THDA 653, Performance Project; THDA 655, Musical Theatre Styles; THDA 755, Advanced Musical Theatre; THDA 689 A-D, Theatre/Dance Practicum; THDA 798, Senior Seminar.

II. 4 credits from history
Theatre, dance, or music history

III: 6 credits from dance performance
Theatre dance, voice and movement for actors

IV: Select 10 credits from specialty area
Any 10 credits in music, theatre, or dance. The student and advisor will select courses appropriate to the needs of the students.

Total: 62 cr.

Minoring in Theatre and Dance

The General Theatre Major consists of 20 credits in Theatre. Listed below are a variety of specialized minors that have mandatory requirements.

Musical Theatre Minor

10 credits required from Group I
THDA 555, Exploring Musical Theatre; 655, Musical Theatre Styles; 755, Advanced Musical Theatre; 653, Performance Project (Assist in Musical Theatre).

6 credits required from Group II
THDA 463, Theatre Dance I; 563, Theatre Dance II; 663, Theatre Dance III.

4 credits required from Group III
THDA 450, History of the American Musical; 653, Performance Project (Advanced Scene Studies); 795, Independent Study (Lecture/Teach/Class Prep).

Total: 20 cr.

Dance Minor
At least four credits must be from Group II

Group I
THDA 461, Modern Dance I; 462, Ballet I; 562, Ballet II; 662, Ballet III; 463, Theatre Dance I; 563, Theatre Dance II; 663, Theatre Dance III; 597, Dance Theatre Performance; 576, Pointe.

Group II
THDA 487, The Dance; 632, Choreography; 633, Dance Composition; 684, Special Topics, 586, Dance Pedagogy.

Total: 20 cr.

Youth Drama Minor

credits required from Group I.
THDA 520, Creative Drama; 583, Puppetry; 622, Storytelling, Story Theatre, and Involvement Drama; 624, Theatre for Young Audiences.

4 credits required from Group II.
THDA 621, Education Through Dramatization; 653A, Performance Project; 653B, Performance Project; 795, Independent Study

Total: 20 cr.

Women's Studies

(For descriptions of courses, see page 218.)
Women's studies provides students with an understanding of the status of women in various cultures and historical eras. Students learn the use of gender as a category of analysis and increase their knowledge of women's contributions to many fields. Women's studies courses offer students critical perspectives on such basic questions of the social order as assumptions about gender roles and gender identity.

A major or minor in women's studies prepares students for careers where the changing roles of women are having a perceptible impact. Women's studies graduates go on to law school and graduate school in a variety of disciplines. Some have taken positions with social change or family service agencies, while others have found work in such fields as communication, education, affirmative action, and personnel.

Women's Studies Major

For the women's studies major, students must complete 40 credits of women's studies courses (or 32 in the case of a second major) with grades of C– (1.67) or better and an overall grade-point average of 2.00 or better. These courses must include the following three: (1) WS 401, Introduction to Women's Studies, normally taken at the beginning of the course sequence; (2) WS 632, Feminist Thought, or an approved course in feminist theory; and (3) a 700-level WS-designated course (for instance, WS 795, 796, 797, 798, or 799). Electives are chosen in consultation with a faculty adviser principally from other women's studies courses including WS 595 (Special Topics in Women's Studies) and cross-listed departmental offerings.

Departmental offerings include the following regularly repeated cross-listed courses:

ARTS 487D, Themes and Images in Art. Major Mythic Images of Women
ARTS 690, Women Artists of the Nineteenth and Twentieth Centuries
CMN 567, Images of Gender in the Media
CMN 583, Gender and Expression
ECON 698, Topics in Economics: Women in Economic Development
EDU 797, Mentoring & Beyond: Adolescent Girls
ENGL 585, Introduction to Women in Literature
ENGL 586, Introduction to Women Writers
ENGL 685, Women's Literary Traditions
ENGL 785, Major Women Writers
FS 545, Family Relations
FS 757, Race, Class, Gender, and Families
GERM 520, Women in German Literature and Society
GERM 524, Topics in German Film
HIST 565, Women in Modern Europe
HIST 566, Women in American History
HIST 596, Introduction to Gay and Lesbian History
NURS 595, Women's Health
PHIL 510, Philosophy and Women
PSYC 711, Psychology in 20th Century Thought & Society
SOC/ANTH 625, Female, Male, and Society
SOC 630, Sociology of Gender

Students may also select from other courses that are offered as special topics by the departments. In the past, such offerings have included the following: ANTH 697, Women in the Middle East; CMN 616, Women and Film; FREN 525, French Women: Subject and Object.

Electives must show a balance between arts and humanities/social sciences and be distributed between upper (600 and 700) and lower (400 and 500) level courses; no more than four electives may be from the same department. No fewer than five courses should be taken at the upper level. Strongly recommended are a practicum or internship course and a course that focuses on women of color or cross-cultural perspectives.

Women's Studies Minor

The minor consists of 20 credits of women's studies courses. These must include WS 401, Introduction to Women's Studies, and WS 798, Colloquium in Women's Studies, normally taken at the beginning and end of the course sequence, respectively. In between, students should select other women's studies courses or cross-listed courses from departmental offerings. (For a more complete description of the women's studies minor, see page 30.)

Students who wish to major or minor in women's studies should consult with the coordinator, 203 Huddleston Hall, 862-2194.

World Literatures and Cultures in English

The following courses are all taught in English and have no prerequisites.

WLCE 425F, Intro to French Studies	5
WLCE 425I, Intro to Italian Studies	5
WLCE 425R, Intro to Russia	5
WLCE 511C, Major Greek Authors in English	8
WLCE 512C, Major Roman Authors in English	8
WLCE 520G, Women in German Literature	8
WLCE 521G, Major German Authors in Translation	8
WLCE 521R, 19th Century Russian Literature in English	8
WLCE 522R, 20th Century Russian Literature in English	8
WLCE 523G, Women in German Film	5
WLCE 524G, Special Topics in German Film	5
WLCE 525F, Intro to French Civilization	5
WLCE 525G, German Culture and Civilization in English	5
WLCE 525S, Spanish Civilization and Culture	5
WLCE 526F, Intro to Francophone Civilization	5
WLCE 526S, Latin American Civilization and Culture	5
WLCE 593R, Major Russian Authors in English	8
WLCE 621F, French Prose in Translation	8
WLCE 621I, Italian Literature in Translation 13-16C	8
WLCE 621S, Spanish and Portuguese Literature in Translation	8
WLCE 622F, French Drama in Translation	8
WLCE 622I, Italian Literature in Translation 18-20C	8
WLCE 622S, Latin American and Brazil Literature in Translation	8

College of Engineering and Physical Sciences

Roy B. Torbert, Dean
Samuel D. Shore, Associate Dean

Department of Chemical Engineering
Department of Chemistry
Department of Civil Engineering
Department of Computer Science
Department of Earth Sciences
Department of Electrical Engineering
Department of Mathematics
Department of Mechanical Engineering
Department of Physics
Engineering Technology Program

Bachelor of Science
Chemical Engineering*
- Energy
- Environmental Engineering

Chemistry*
Civil Engineering*
Computer Science*
Electrical Engineering*
- Computer Engineering
- Signals and Systems

Electrical Engineering Technology*
Environmental Engineering
- Chemical Engineering
- Civil Engineering

Geology*
Hydrology*
Interdisciplinary Mathematics
- Computer Science
- Economics
- Electrical Science
- Physics
- Statistics

Mathematics*
Mathematics Education*
- Elementary
- Middle/Junior High
- Secondary

Mechanical Engineering*
Mechanical Engineering Technology*
Physics*
- Applied Physics Optics
- Biophysics
- Chemical
- Environmental Radiation
- Materials Science

Bachelor of Arts
Chemistry
Chemistry and Physics Teaching
Earth Science Teaching
Earth Sciences
Mathematics
Physics
- Biophysics

*Designated degree (the name of the specialization is on the diploma; e.g., B.S. in Chemistry).

The College of Engineering and Physical Sciences provides an opportunity for students to achieve educational objectives appropriate to their interests in engineering, mathematics, and the physical sciences. The college offers an education in each of its twelve primary disciplines leading to the bachelor of science, and a liberal education coupled with majors in mathematics and each of the three physical sciences leading to the bachelor of arts. All programs include an opportunity for study in the arts, humanities, and social sciences.

The key to an undergraduate program in the college is flexibility, with a strong emphasis on personal and individualized education. In addition to specific programs, a number of options are available. Special programs can be developed to meet the specific interests of individual students.

MATH 425 and 426 (Calculus I and II) or the equivalent in transfer credits or advanced placement approved by the Department of Mathematics are required by all departments of the college for their majors. Prerequisites for calculus are three years of college-preparatory mathematics, including a half-year of trigonometry.

Accreditation
The baccalaureate-level programs in chemical, civil, electrical, and mechanical engineering are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. The baccalaureate-level programs in electrical and mechanical engineering technology are accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology. The baccalaureate-level program in computer science is accredited by the Computer Science Accreditation Commission of the Computing Sciences Accreditation Board. The Department of Chemistry's undergraduate bachelor of science program is approved by the American Chemical Society.

Degree Requirements
Candidates for a degree must satisfy all of the University general education requirements for graduation, as well as the particular requirements of their individual major programs. In order to meet one of the requirements of the Accreditation Board for Engineering and Technology, engineering students must take a two-course sequence which provides an opportunity to study an area in depth. The two-course sequences listed below will provide this opportunity and will also satisfy two of the University's general education requirements. We strongly urge you to satisfy this requirement as soon as possible. Students who choose to gain the required in-depth experience by taking sequences not listed below, may find that they will need to take more courses than those indicated in the program outline that follows.

ANTH 411-ANTH 518
ANTH 411-ANTH 625, SOC 625
ANTH 411-SOC 530
CMN 456-CMN 457
FREN 525-FREN 621
GEOG 401-GEOG 581
GEOG 401-GEOG 582
GEOG 402-GEOG 581
GEOG 402-GEOG 582
HIST 421-HIST 425
HIST 421-RUSS 425
HIST 435-ARTS 580
HIST 435-ARTS 581
HIST 436-ARTS 580
HIST 436-ARTS 581
HIST 436-FREN 525
HIST 436-GERM 525
HIST 436-SPAN 525
HIST 483-HIST 484
HIST 497-HIST 425
HUMA 401-HUMA 510A, 511A, 512A, 513A
HUMA 401-HUMA 510C, 511C, 512C, 513C

HUMA 401-HUMA 510D, 511D, 512D, 513D
PHIL 401-PHIL 421
PHIL 430-PHIL 421
POLT 403-POLT 560
PSYC 401-PSYC 571
RUSS 425-RUSS 521
RUSS 425-RUSS 593

Bachelor of Science in Mathematics
Mathematics–Computer Science option
Mathematics–Economics option
Mathematics–Electrical Science option
Mathematics–Physics option
Mathematics–Statistics option
For details of these programs, please see page 64 under Mathematics.

Degrees

Bachelor of Science

The programs leading to the bachelor of science degree, offered in each of the departments of the college, emphasize the preparation of students for a professional career and continuing or graduate education.

The degree requirements for the bachelor of science include the University general education requirements (page 19) and the specific departmental requirements for graduation. A minimum grade-point average of 2.00 must be achieved. Graduation credit requirements established by the departments range from 128 to 133. There are enrollment limitations in some programs, and it is not possible to guarantee all change-of-major requests.

Bachelor of Arts

Programs leading to a bachelor of arts degree are offered in the departments of chemistry, earth sciences, mathematics, and physics. These programs provide a broad liberal education along with a major in one of these fields. The University requirements for the bachelor of arts degree are on page 20.

Interdisciplinary Majors

Bachelor of Science in Hydrology

The hydrology major is an interdisciplinary major offered by the departments of earth sciences and civil engineering. The coordinator of the program is S. Lawrence Dingman of the Department of Earth Sciences. For details of this program, please see B.S. in hydrology under earth sciences (page 60).

Interdisciplinary Minors

Interdisciplinary minors have been developed in environmental engineering, hydrology, illumination engineering, materials science, ocean engineering, and oceanography. These programs enable students to obtain experience in the specialized area and to retain identification with their major professional area. (For University requirements, see page 20.)

Environmental Engineering

The environmental engineering minor is intended primarily for students in engineering and physical sciences, who are not in the chemical engineering degree program. Students contemplating such a minor should plan on a strong background in the sciences and mathematics (including differential equations).

The minor provides a comprehensive introduction to major areas of interest in environmental protection, namely air pollution and water pollution, through the three required courses. Further breadth in environmental engineering or depth in specific areas can be attained through the choice of appropriate elective courses.

Requirements for the minor include a minimum of five courses totaling at least 18 credits over and above those required for the BS degree, chosen from the following: (1) three required courses: CHE 709, Fundamentals of Air Pollution and Its Control; ENCV 645, Fundamental Aspects of Environmental Engineering; CHE 772, Physicochemical Processes for Water and Air Quality Control, *or* ENCV 643, Environmental Sampling and Analysis; (2) a minimum of two elective courses from the following list: CHE 604, Chemical Engineering Thermodynamics; CHE 605, Mass Transfer and Stagewise Operations; CHE 606, Chemical Engineering Kinetics; CHE 772, Physicochemical Processes for Water and Air Quality Control; ENCV 739, Industrial Wastewater Treatment; ENCV 740, Public Health Engineering; ENCV 742, Solid and Hazardous Waste Engineering; ENCV 744, Physicochemical Treatment Design; ENCV 746, Bioenvironmental Engineering Design; ENCV 747, Introduction to Marine Pollution and Control; ENCV 748, Solid and Hazardous Waste Design; ENCV 749, Water Chemistry; ENCV 753, Marine Pollution at Shoals Marine Laboratory; CIE 755, Design of Water Transmission Systems; *or* 695, Engineering Projects (CHE, ENCV, CIE, EE, ME).

Choice of elective courses should be made in consultation with the minor area adviser, Nancy Kinner, civil engineering, or Stephen S. T. Fan, chemical engineering. Students normally start this program in the junior year and should declare their intention to enter the program as early as possible during the sophomore year. During the final semester, students should apply to the dean to have the minor appear on the transcript.

Hydrology

The minor in hydrology is open to all students in the University. It consists of a minimum of six courses totaling at least 18 credits. Students must earn grades of C (2.00) or better and take no pass/fail courses. No more than 8 major requirement credits may be used. All courses in the program shall be selected by students in consultation with the hydrology minor adviser in the Department of Earth Sciences.

Required courses are (1) ESCI 401, Principles of Geology I, *or* ESCI 409, Environmental Geology; (2) ESCI 705, Principles of Hydrology; (3) ESCI 710, Groundwater Hydrology; (4–6) at least three of the following courses: ESCI 561, 703, 708, 747; CIE 642, 741, 742, 743, 745, 749; NR 757, 759, 760; WARM 504, 603, 700, 711, 713, 716, 718, 721; PBIO 717, 719.

Students are encouraged to declare their intention to enter the program before the end of the junior year. During the final semester, students should apply to the dean to have the minor appear on the transcript.

Illumination Engineering

Lighting is pervasive in our society, representing roughly one percent of the nation's GNP. The purpose of the illumination engineering minor is to introduce students to the world of light, from its pure science to its practical application.

The minor is open to juniors and se-

niors who desire a multidisciplinary experience in the science and technology of light and vision. Completion of this minor will prepare a student for entry into a variety of positions in the lighting industry with light source companies, lighting fixture companies, utilities, energy management firms, consulting firms, building systems companies and design firms.

To enter the minor, students must have completed MATH 425 and 426, PHYS 407 and 408, and CS 410, or have equivalent background. Some elective courses listed for the minor may have additional prerequisites. No more than one course expressly specified as being required in the student's major may be used to satisfy minor requirements.

Requirements for the minor are a minimum of five courses totaling at least 18 credits, distributed as follows:

Required courses:
ET 762, Illumination Engineering
ET 763, Lighting Design and Applications

Two courses from among
EE 760, Introduction to Fiber Optics
EE 761, Optical Engineering
PSYC 710, Visual Perception
TECH 564, Fundamentals of CADD/CAE/CIM
MATH 644, Probability and Statistics for Applications
ET 734, Economics of Business Activities

One course from among
ARTS 532, Introductory Drawing
ARTS 455, Introduction to Architecture
ARTS 574, Architectural History
THDA 548, Stage Lighting Design and Execution

Students should declare their intent to enter the minor in their junior year and plan their program in consultation with either of the minor advisors: Professor Ralph Draper, Engineering Technology, Parsons 138 or Professor Joseph Murdoch, Electrical Engineering, Kingsbury 242.

Students should complete an Intent to Minor form at the beginning of their program and a Completion of Minor form during their last semester. Students may apply to the dean to have the minor appear on their transcripts.

Materials Science

The minor, administered by the Department of Mechanical Engineering, is open to all students of the University and offers a broad introduction to materials science. Students should contact the minor supervisor by midsemester of their junior year.

Students must complete at least 18 credits and a minimum of five courses as follows: ME 561 (required); ME 760 (required); and ME 730 (required); additional courses from the group ME 695 (materials), 696 (materials), 730, 731, 760, 761, 762, and 795 (materials).

Interested students may consult James E. Krzanowski, Department of Mechanical Engineering.

Ocean Engineering

The ocean engineering minor is described under marine sciences on page 102.

Oceanography

The oceanography minor is described under marine sciences on page 102.

Other Programs

Independent Study and Projects

All departments within the college offer courses in independent study or in projects, the content varying with the current scientific and technological needs and with student and faculty interest.

Permission of the instructor and/or the department chairperson is required. (See the course descriptions for the independent study and project courses and for specific requirements.) The initiative for independent study courses in any area rests with the student.

Special Provisions

The requirement of a given course in any prescribed curriculum may be waived by the faculty of a student's college. The student's petition must be approved by his/her major adviser and the dean of the college. This power will usually be delegated by the faculty to the dean or to a committee. (Senate Rule 05.21(s): Waiver of Requirements in a Prescribed Curriculum.)

This rule offers students the opportunity to develop a somewhat individualized plan of study with intellectual incentives and opportunities in addition to those in a regular curriculum.

In addition, upon the recommendation of the department chairperson, superior students may be allowed to count credits from up to two 800-level courses toward both a bachelor's degree and a master's degree, provided that the students have been admitted to the master's program.

Research Opportunities

The talents and expertise of the faculty in all departments are reflected in the number of ongoing research projects. Undergraduates are included in many of these research projects with the intent of discovering and fostering their creative talents. In funded research projects, students may have an opportunity to receive pay while learning.

A multiplicity of research programs is reflected in special facilities: the Analog Computer Facility, Antenna Systems Laboratory, Bioelectronics Laboratory, Computation Science Center, Electronics Laboratory, Engineering Design and Analysis Laboratory, Fluid Mechanics Laboratory, Materials Laboratories, Mechanics Research Laboratory, Sanitary Engineering Laboratory, Solid State Laboratory, Space Science Center, Wind Tunnel and Water Tunnel Facility, and X-ray Laboratory.

Students have the opportunity to acquire applied experience in business and industry by working with faculty members who undertake client-sponsored professional projects in management and technical areas for business and industry, and for state and local governments.

Study Abroad Programs

Hungary

The College of Engineering and Physical Sciences has arranged an opportunity for its students to spend the fall semester of their junior year at the Technical University of Budapest (TUB) in Budapest, Hungary. Courses at TUB are taught in English and receive prior approval for degree credit. Students studying in Budapest, therefore, will graduate on schedule at UNH. A general education course on the language, geography, and culture of Hungary, taken at TUB, is required. The foreign student office at TUB will appoint a Hungarian adviser for each student and will assist in obtaining housing either in dormitories, or in apartments. Further information is available from Carol French, coordinator of the program, CEPS Dean's Office, or the college's foreign exchange program coordinator, Professor Andrzej Rucinski.

Puerto Rico

Students may spend one or two semesters at the University of Puerto Rico (UPR) at Mayaguez, the second largest of

the three major campuses in the UPR system. While having the opportunity to learn in a Latin American environment, participants maintain their status as UNH students, pay UNH tuition, and will be able to graduate from UNH on schedule. The exchange is open to students and faculty members from all UNH majors. Since eighty percent of all courses at UPR are taught in Spanish, participants must be proficient in Spanish. Interested CEPS students should contact Carol French (862-1783) in the Office of the Dean, Kingsbury Hall.

Preparing for Teaching

Students interested in mathematics education (elementary, middle/junior high, or secondary), chemistry and physics teaching, earth science teaching, or general science teaching should refer to the Department of Education section (page 34) and to the appropriate department for a description of the requirements.

Combined Programs of Study

In addition to pursuing a single major, students may combine programs of study as follows:
Minors: See page 21; see also pages 24 and 51 and Departmental Programs of Study in this section.
Second Majors: See page 21.
Interdisciplinary Majors: Many of the departments in the college offer ways of combining a major with another field of interest. See the descriptions that follow.
Dual-Degree Programs: See page 21.
Student-Designed Majors: See page 103.
Other combined and interdisciplinary opportunities: See page 100.

Programs of Study

In addition to the following departmental majors and options, departmental minors are offered in chemical engineering, chemistry, electrical engineering, geology, hydrology, mathematics, applied mathematics, mechanical engineering, physics, and statistics.

Chemical Engineering

(For descriptions of courses, see page 131.)
The Department of Chemical Engineering currently offers the undergraduate degree program in chemical engineering with options in energy and environmental engineering. Pending final approval from the Board of Trustees, beginning with the fall semester of 1999, the department will add another undergraduate program, the B.S. program in environmental engineering (chemical engineering option).

Bachelor of Science in Chemical Engineering

Chemical engineering is concerned with the analysis and design of processes that deal with the transfer and transformation of energy and material.

The practice of chemical engineering includes the conception, development, design, and application of physicochemical processes and their products; the development, design, construction, operation, control, and management of plants for these processes; and activities relating to public service, education, and research.

Traditional employment areas in the chemical process industries include industrial chemicals, petroleum and petrochemicals, plastics, pharmaceuticals, metals, textiles, and food. Chemical engineers are also working in increasing numbers in the areas of energy engineering, pollution abatement, and biochemical and biomedical engineering; in addition, they are employed by many government laboratories and agencies as well as private industries and institutions.

The curriculum trains students to enter the diverse areas of employment or graduate study. The considerable number of electives in the curriculum provides flexibility for individuals to design programs that fulfill their needs and interests. They also provide an opportunity for students to elect departmental options or interdisciplinary minors.

A minimum of 129 credits is required for graduation with the degree of bachelor of science in chemical engineering. There are nine electives in the chemical engineering curriculum. Six of these are for the general education requirements. The remaining three electives should consist of two chemical engineering electives and one engineering elective outside of the department. In fulfilling general education requirements, no technology courses in Group 3 will be accepted.

Students are required to obtain a minimum 2.00 grade-point average in CHE 501-502 and in overall standing at the end of the sophomore year in order to continue in the major.

Freshman Year	Fall	Spring
ENGL 401, Freshman English	—	4
MATH 425-426, Calculus I and II	4	4
PHYS 407, General Physics I	—	4
CHEM 405, General Chemistry	4	—
CHE 410, Survey of Current Energy and Pollution Control Technology	—	4
Electives* (2)	8	—
	16	16
Sophomore Year		
CHEM 683-684, Physical Chemistry I and II	3	3
CHEM 685-686, Physical Chemistry Laboratory	2	2
MATH 527, Differential Equations with Linear Algebra	4	—
CS 410, Introduction to Scientific Programming	—	4
PHYS 408, General Physics II	4	—
CHE 501-502, Introduction to Chemical Engineering I and II	3	3
Elective*	—	4
	16	16
Junior Year		
CHEM 651-652, Organic Chemistry	3	3
CHEM 653, Organic Chemistry Laboratory	2	—
CHE 601, Fluid Mechanics and Unit Operations	3	—
CHE 602, Heat Transfer and Unit Operations	—	3
CHE 603, Applied Mathematics for Chemical Engineers	4	—
CHE 604, Chemical Engineering Thermodynamics	—	4
CHE 612, Chemical Engineering Laboratory I	—	3
Electives* (2)	4	4
	16	17
Senior Year		
CHE 605, Mass Transfer and Stagewise Operations	3	—
CHE 606, Chemical Engineering Kinetics	3	—
CHE 608, Chemical Engineering Design	—	3
CHE 613, Chemical Engineering Laboratory II	3	—
CHE 752, Process Dynamics and Control	—	4
Electives* (4)	8	8
	17	15

* See page 50 for degree requirements.

Energy Option

This option covers the major areas of current interest in the energy field. The required courses provide students with a general background knowledge of fossil fuels, nuclear power, solar energy, and other alternative energy resources. The elective courses will permit the student to study topics of special interest in more depth or gain a broader perspective on energy and some closely related subjects. Three courses are required, and a minimum of two additional courses of at least 3 credits each should be selected from the electives list. Students interested in the energy option should declare their intention during the sophomore year to the department faculty. They may consult with Stephen S. T. Fan.

Required Courses	Credits
CHE 705, Natural and Synthetic Fossil Fuels	4
CHE 712, Introduction to Nuclear Engineering	4
ME 705, Thermal System Analysis and Design	4
	12
Elective Courses	
CHE 695, Chemical Engineering Project	3–4
CHE 696, Independent Study	3–4
CHE 772, Physicochemical Processes for Water and Air Quality Control	4
ME 705, Thermal System Analysis and Design	3
	6–8

Environmental Engineering Option

The chemical engineering program, with its substantial requirements in chemistry, fluid dynamics, heat transfer, mass transfer, unit operations, and reaction kinetics, provides students with a unique preparation to deal with many aspects of environmental pollution problems. The option gives students a special focus on the application of chemical engineering principles and processes to the solution of problems relating to air pollution, water pollution, and the disposal of solid and hazardous waste. Three required courses must be selected, plus two electives from the electives list. Each course must carry a minimum of 3 credits. Students interested in the environmental engineering option should declare their intention during the sophomore year to the department faculty. They may consult with Stephen S. T. Fan.

Required Courses	Credits
CHE 709, Fundamentals of Air Pollution and Its Control	4
CHE 772, Physicochemical Processes for Water and Air Quality Control	4
CIE 748, Solid Waste and Residuals Management	3
	11
Elective Courses	
CHE 695, Chemical Engineering Project	3–4
CHE 696, Independent Study	3–4
CHE 744, Corrosion	4
CIE 746, Biological Treatment Design	3
CIE 749, Water Chemistry	4
	6–8

Bachelor of Science in Environmental Engineering

Chemical Engineering Option (Pending Trustees' Approval)

The chemical engineering option of environmental engineering is a process-based program that draws on the principles of chemistry, physics, mathematics, and engineering sciences. Due to the complex nature of many aspects of environmental pollution, a broad understanding of the fundamentals of engineering and sciences forms the most desirable preparation for a career in the environmental field. The program is designed to provide training not only for end-of-pipe pollution control technologies, but also for expertise in process engineering and process design, essential for achieving the objectives of pollution curtailment and prevention. Such training is especially valuable in resolving industrial pollution problems. Career opportunities for environmental engineers with this background are found in industry, research institutes, government agencies, teaching, and consulting practice. Students may also enter graduate study at the M.S. or Ph.D. levels.

Students may participate in research projects under faculty supervision. The faculty of the program have been involved with many externally funded research projects including industrial stack gas pollution control, clean coal technology, fluidized-bed combuster and diesel-engine emission control, and catalysts and enzymes for bioremediation of wasterwater. The University provides support for undergraduate research through its Undergraduate Research Opportunities Program.

Students may also take part in the Pollution Prevention Internship Program. Since 1993, the department has administered a Pollution Prevention Internship Program with industries in New Hamsphire, Maine, and Massachusetts, initially funded by US EPA and NHDES. In the past five years, the program has served over forty facilities. Each year about twelve students have enrolled in the Pollution Prevention Internship Program which provides hands-on industrial employment for ten weeks during the summer assisting industry with projects in process modification, material substitution, chemical re-use, risk assessment, safety and economic analysis. The work of these student interns has resulted in an annual saving of two million dollars for New Hampshire industries alone, as well as reduction in pollution. The Pollution Prevention Internship Program has received recognition from US EPA, NHDES, and the Coast Guard. The department faculty also assisted NHDES in setting up instrumentation in the seacoast region of New Hampshire to monitor the precursor of ozone formation.

The B.S. program requires a minimum of 133 credits for graduation and can be completed in four years. There are eight electives in the curriculum: five for the fulfillment of the University's general education requirements and the remaining three for technical electives to be chosen from the specified elective course list. Due to the substantial overlap in course requirements for the environmental engineering and chemical engineering majors, students will be able to transfer between these two programs during the first three semesters without losing any course credits towards graduation.

At the end of the sophomore year, students are required to have a minimum overall grade-point average of 2.00 and a grade-point average of 2.00 in CHE 501-502 in order to be permitted to enroll in the junior-level courses.

First Year	Fall	Spring
CHEM 405, General Chemistry	4	—
MATH 425-426, Calculus I & II	4	4
PHYS 407, General Physics I	—	4
ENGL 401, Freshman English	4	-
ME 441, Engineering Design and Graphics	4	—
General Education Electives	—	8
	16	16
Second Year		
CHE 501-502 Intro. Chemical Engineering (Material and Energy Balances)	3	3
CHEM 683-684, Physical Chemistry I & II	3	3
CHEM 685, Physical Chemistry Lab I	2	—
MATH 527, Differential Equations	4	—
PHYS 408, General Physics II	4	—
CS 410, Intro to Scientific Programming	—	4
General Education Electives	—	8
	16	18
Third Year		
CHE 601, Fluid Mechanics and Unit Operations	3	—
CHE 604, Chemical Engineering Thermodynamics	—	4
CHE 612E, Chemical Engineering Lab I —Environmental	—	3
CHEM 651-652, Organic Chemistry I & II	3	3
CHEM 653, Organic Chemistry Lab I	2	—
MATH 644, Statistics for Engineers & Scientists	4	—
CE 742, Solid and Hazardous Waste Engineering	—	3
General Education and Technical Electives	4	3-4
	16	16–17
Fourth Year		
CHE 605, Mass Transfer and Stagewise Operations	3	—
CHE 608E, Chemical Engineering Design —Environmental	—	3
CHE 613E, Chemical Engineering Lab II —Environmental	3	—
CHE 709, Fundamentals of Air Pollution and Control	4	—
CHE 752E, Process Dynamics and Control —Environmental	—	4
CHE 772, Physicochemical Processes for Water and Air Quality Control	—	4
ESCI 710, Groundwater Hydrology	—	4
MICRO 501, Public Health Microbiology	4	—
Technical Electives	3–4	3–4
	17–18	18–19

Suggested Technical Electives	Credits
CHE 602, Heat Transfer and Unit Operations	3
CHE 606, Chemical Engineering Kinetics	3
CHE 744, Corrosion	4
CE 739, Industrial Wastewater Treatment	3
CE 746, Bioenvironmental Engineering Design	4
CE 747, Marine Pollution	3
CE 766, Geoenvironmental Engineering	3
ESCI 409, Environmental Geology	4
ESCI 561, Surficial Processes	4
ESCI 705, Principles of Hydrology	4
ESCI 708, Hydrology	3
ESCI 715, Global Atmospheric Chemistry	3
EE 772, Control Systems	4
MICRO 503, General Microbiology	5

Chemistry

(For descriptions of courses, see page 131.)

"Chemistry is everywhere. From agriculture to health care, chemistry extends life and improves its quality. From disposable diapers to space suits, chemistry provides new materials—for clothing, shelter, and recreation. From computer chips to fiber optics, chemistry is the foundation of today's high technology" (American Chemical Society, 1987).

Study in chemistry leads everywhere—to careers in education, law, forensics, medicine, biotechnology, environmental protection, technical sales, semiconductors, and industrial chemicals production.

Students interested in chemistry may major in one of three programs offered in the department, depending upon their plans for a career. Since the required chemistry courses in each degree program are the same in the first year, it is easy to change from one program to another.

In each of the programs, students should register for the following courses in the first year: CHEM 405 (first semester), General Chemistry; CHEM 406 (second semester), Quantitative Analysis; MATH 425 (first semester), Calculus I; and MATH 426 (second semester), Calculus II. Students interested in a chemistry program may consult with the coordinator of undergraduate studies in the department.

Bachelor of Science in Chemistry

This curriculum prepares students for careers requiring a thorough knowledge of chemistry and provides a strong foundation for graduate study in chemistry or in interdisciplinary areas. The curriculum requires a greater depth in chemistry and physics than do the other degree programs.

Requirements

1. Satisfy general education requirements.
2. For specific course requirements, see the accompanying chart.

Bachelor of Arts, Chemistry Major

This curriculum offers students the opportunity to combine a chemistry major with other interests, for example, the prehealing arts, education, or business.

Requirements

1. Satisfy general education requirements.
2. Satisfy the bachelor of arts degree requirements (see page 20).
3. For specific course requirements, see the accompanying chart.

Chemistry Baccalaureate Degree Requirements

Chemistry Courses	B.S.	B.A.
405*, General	x	x
406 & 407, Quant. Analysis	x	x
547 & 549, Organic I	x	x
548 & 550, Organic II	x	x
574, Intro. Inorganic	x	x
683 & 685, Physical I	x	x
684 & 686, Physical II	x	x
762 & 763, Instrum. Analysis	x	x
698, Seminar	x	
699, Thesis	x	
755 & 756, Adv. Organic	x	
774 & 775, Adv. Inorganic	x	
776, Physical III	x	
708, Spectroscopic Invest.		
778, Large Molecules		

Other Requirements

All majors. MATH 425 and 426, Calculus I and II.

B.S. degree: PHYS 407-408, General Physics I and II; two chemistry-related courses (only one of which may be a chemistry course).†

B.A. degree, chemistry major. PHYS 407, General Physics I, or PHYS 401-402, Introduction to Physics I and II; two other CHEM courses, except 698, or two approved chemistry-related courses.†

*CHEM 403-404 may be substituted for CHEM 405, but this is not recommended.

†Suggested courses: MATH 527, 528; PHYS 505; EE 620; BCHM 658, 751.

Bachelor of Arts, Chemistry and Physics Teaching

This major is designed for students who wish to teach chemistry and physics in secondary schools. The number of positions available for teaching only chemistry or physics is limited, and there are more opportunities to teach both subjects on the secondary-school level. Chemistry and physics teaching majors will have good preparation for teaching these sub-

jects and will have the necessary mathematics and education background.

Requirements

1. Satisfy general education requirements.

2. Satisfy the bachelor of arts degree requirements (see page 20).

3. Chemistry requirements: 405, General Chemistry, or 403-404, General Chemistry; 406, 407, Quantitative Analysis; 545, 546 or 547-548 and 549-550, Organic Chemistry; 683-684 and 685-686, Physical Chemistry I and II.

4. Physics requirements: 407, General Physics I; 408, General Physics II; 505, General Physics III; 605, Experimental Physics I. PHYS 406, Introduction to Modern Astronomy, is strongly recommended.

5. Math requirements: 425, Calculus I, and 426, Calculus II.

6. All education courses in the teacher preparation program (see page 34).

General Science Certification

See pages 34 and 84.

Civil Engineering

(For descriptions of courses, see pages 133 and 156.)

Civil engineering encompasses a very broad spectrum of engineering disciplines. This broad spectrum is the result of the technical needs of civilization as it has progressed through the millennia. Civil engineering has the major subdisciplines of: structural engineering, water resources engineering, geotechnical engineering, environmental engineering, transportation engineering, construction engineering, and surveying and mapping. Civil engineers are involved with planning, designing, analyzing, managing, researching, and/or constructing projects. There is a constant market for civil engineers due to the demands placed on the profession by society.

The civil engineering program provides a firm base in mathematics, science, and engineering. Majors are expected to develop excellent communication and computer-related skills. The civil engineering department offers two undergraduate degrees: a B.S. degree in civil engineering and a B.S. degree in environmental engineering. These degree programs prepare majors to either enter the profession or to pursue further advanced study.

Bachelor of Science in Civil Engineering

(For descriptions of courses, see page 133.)

Civil engineers plan, design, and direct the construction of public and private facilities that are essential to modern life and vary widely in their nature, size, scope, operation, use, and location. For example, civil engineers design and build: tunnels, bridges, dams, roads, airports, transit systems, facilities for treatment and distribution of drinking water, solid waste management facilities, wastewater collection and treatment facilities, and hazardous waste remediation systems. These facilities must provide safe and efficient service to the users, be cost-effective, and be compatible with the environment.

The civil engineering degree program prepares graduates for many career opportunities, typically in public, private, or university career paths. Students must enter the program with an open and creative mind. Analytical rigor is obvious, but imagination, creativity, and communication skills are just as important in resolving the many problems presented to civil engineers. Some graduates of the program pursue future education and careers in medicine, law, and business.

The Department of Civil Engineering (CIE) excels in environmental engineering, geotechnical engineering, materials engineering, and structural design. Involvement with the Hydrology Program also provides for strength in water resources engineering. A student may design a program which covers a broad range of civil engineering topics, or may focus on a particular area. For example, students may elect from up to: 37 credits in environmental engineering, 26 credits in structural design, 9 credits in materials engineering, 9 credits in geotechnical engineering, or 16 credits in water resources engineering.

The importance of planning, design, and construction of facilities is stressed from the first semester on. Students in CIE 400 are introduced to a project, and use that project for examples, theory, and problems in all subsequent civil engineering courses during their tenure. The project is selected from a wide range of local, large construction projects that entail all facets of civil engineering. In a typical project, UNH graduates are involved with planning, design, oversight and/or construction. Therefore, current students have many opportunities to visit and tour a construction site, and engineers from the project come into their classes to discuss the project with them.

The following schedule is the planned program for civil engineering students. This schedule subscribes to the rigorous guidelines of the Accreditation Board for Engineering and Technology (ABET). The department has been continuously accredited by ABET since 1936 when accreditation began in the U.S. The program also provides the flexibility for majors to elect roughly one third of the total credits required for graduation.

First Year	**Fall**	**Spring**
CIE 400, CIE Lectures	1	—
Elective (1) general education requirement*	4	—
ENGL 401, Freshman English	4	—
MATH 425, 426, Calculus I, II	4	4
CHEM 403, 404, General Chemistry	4	4
CIE 505, Surveying	—	4
PHYS 407, General Physics I	—	4
	17	16
Sophomore Year		
PHYS 408, General Physics II	4	—
MATH 527, Differential Equations with Linear Algebra	4	—
Professional Developmental Elective **	4	—
CIE 528, 529, Mechanics I, II	4	4
MATH 644, Probability and Statistics for Applications	—	4
CIE 530, Introduction to Civil Engineering Applications	—	3
MATH, elective** or general education elective*	—	4
Elective (1) general education requirement*	—	4
	16	19
Junior Year		
ENCV 520, Environmental Pollution and Protection	4	—
CIE 642, Fluid Mechanics	4	—
CIE 665, Soil Mechanics	4	—
CIE 681, Classical Structural Analysis	3	—
MATH, elective** or general education elective*	4	—
CIE 622, Engineering Materials	—	4
CIE 633, Systems Analysis	—	3
ENCV 645, Fundamental Aspects of Environmental Engineering	—	4
CIE 760, Foundation Design I	—	4
	19	15

Senior Year		
CIE 774, Reinforced Concrete Design	4	—
Engineering Science, elective**	3	—
Electives (2), general education requirements*	4	4
CIE/ENCV, electives (4)***	6	6
CIE 788, Project Planning and Design	—	4
	17	14

* See page 19 for general education requirements.
**Approved list available in CIE office.
*** A minimum of one approved design course is required. These courses can be taken, if desired, in a specific discipline within civil engineering, e.g., environmental, structural, water resources, or geotechnical engineering.

The general education, engineering science, professional development, and mathematics electives are chosen to meet requirements of the University, the Department of Civil Engineering, and ABET. The engineering science elective is a course taken from a department in the College of Engineering and Physical Sciences other than civil engineering. Students must have the proper prerequisites to select this course. Complete and current lists of the engineering science, mathematics, and professional development electives are available from the civil engineering department. General education requirements are listed on page 19.

ABET requires that civil engineers have both depth and breadth in their general education. The College of Engineering and Physical Sciences has designed various two-course sequences to satisfy both the University's general education and the ABET depth requirements. The current list of these courses appears on page 50 of this catalog. There are other course sequences that could satisfy this ABET requirement, but the student is required to submit a petition for variance which must be approved before other sequences are accepted.

In order to enter the required 600-level CIE courses (junior year), a CIE major must have completed the mechanics sequence (CIE 528 and CIE 529) plus MATH 425, 426, and PHYS 407 and 408 with a minimum of a 2.00 grade-point average. In addition, the student must have taken and received a passing grade in CIE 530. Exceptions to these requirements are granted only under extremely unusual circumstances and require the department's approval of a written petition.

All CIE 600- and 700-level courses are intended for CIE/ENCV majors only. Nonmajors may enter these courses only with the permission of the instructor. Nonmajors are limited to a maximum of 20 credits of 600- and 700-level CIE courses.

Transfers into the civil engineering major should have a minimum cumulative grade-point average of 2.30 and have taken at least 16 credits (four courses or more) of math, physics, chemistry, and civil and environmental engineering courses with a minimum grade-point average of 2.00. In addition, 16 credits of these courses must exhibit a grade-point average of 2.50 or better. Students transferring into the department may transfer up to a maximum of 20 credits of CIE/ENCV 600- or 700-level coursework. Grades in the transferred courses must be C– or better.

No CIE major may repeat more than two CIE/ENCV courses. Any CIE major who receives lower than a 2.00 grade-point average for more than two consecutive semesters may not continue as a CIE major. Any CIE major who receives lower than a 2.00 cumulative grade-point average in CIE/ENCV courses during any three semesters may not continue as a CIE major.

The CIE program requires a minimum of 133 total course credits for graduation. To qualify for graduation, a CIE major must: have satisfied the previously specified course requirements, have satisfied the University's general education requirements, have a minimum cumulative grade-point average of 2.00, and have a minimum CIE/ENCV cumulative grade-point average of 2.00.

Bachelor of Science in Environmental Engineering

Civil Engineering Option (Pending Trustee's Approval)

(For descriptions of courses, see page 156.)

Environmental engineers plan, design, and construct public and private facilities to minimize the impact of human activity on the environment and to protect human health. For example, environmental engineers with a civil engineering perspective design and build drinking water treatment systems, municipal and industrial wastewater treatment plants, solid waste management facilities, contaminated ground water remediation systems, and hazardous waste remediation facilities. These facilities must meet regulatory requirements, be cost-effective to build and maintain, be safe to operate, and have minimal environmental impact. The environmental engineer is trained to lead the multidisciplinary teams needed to solve complex environmental problems.

The environmental engineering program in the Civil Engineering Department leads to a bachelor of science degree in environmental engineering. The program's strong analytical core and multidisciplinary focus combining engineering and the sciences prepare graduates for many career opportunities in public, private, or academic career paths. Students in the program must possess strong analytical aptitude as well as exhibit creativity, imagination, and excellent written and oral communication skills. The student will learn to understand environmental problems, define the approaches to their solutions and organize the technical resources needed to implement remedies. The program stresses the importance of the ability: to apply knowledge of mathematics, science, and engineering to environmental engineering problems, to analyze and interpret data and solve environmental engineering problems, to design environmental engineering systems, to function on multidisciplinary teams, to communicate effectively, to understand the impact of engineering solutions on society and to understand professional and ethical responsibility.

In ENCV 400, students are introduced to the full spectrum of environmental engineering projects that they will subsequently explore in design teams during their third and fourth years. As part of these experiences, students visit and tour field sites, and interact with engineers who have been involved in the design and/or construction of the projects. Design is integrated throughout the curriculum, and particularly emphasized in junior and senior level courses. In ENCV 645, students form "companies" and must complete a facilities plan for a municipal treatment plant. They analyze treatment alternatives, recommend a system that meets regulatory operational needs, and prepare an implementation schedule and project budget. Detailed design projects are also performed in ENCV 742, 744, and 746. ENCV 788 serves as a capstone design experience where students work on an environmental engineering project provided by a local engineering firm or municipality and apply skills learned in other course while working with real world clients.

The following schedule is a sample of a planned program for environmental engineering students completing the major within the Civil Engineering Department. Similarities between the civil and environmental engineering curriculum within the Civil Engineering Department allow for students to transfer readily from one major to the other until the end of the first year. Thereafter, it is still possible to transfer, but additional coursework may be required. The following schedule for environmental engineering subscribes to the guidelines of the Accreditation Board for Engineering and Technology (ABET). The environmental engineering major is new as of academic year 1998–1999 and will be able to seek accreditation as of 2001. Accreditation, once granted by ABET, will be retroactive to all graduates. The Department of Civil Engineering, in which the ENCV major is housed, has been continuously accredited by ABET since 1936.

First Year	Fall	Spring
ENCV 400, Environmental Engineering Lectures	1	—
ENGL 401, Freshman English	4	—
MATH 425, 426, Calculus I, II	4	4
General Education Elective*	4	4
CHEM 403, 404, General Chemistry I, II	4	4
PHYS 407, General Physics I	—	4
	17	16
Second Year		
ENCV 520, Environmental Pollution and Protection	4	—
CIE 528, 529, Mechanics I, II	4	4
MATH 527, Differential Equations with Linear Algebra	4	—
Earth Science/Soil Sciences/ Microbiology Elective**	4	—
ENCV 556, Environmental Engineering Microbiology	—	4
CHEM 545, Organic Chemistry Lecture	—	3
CHEM 546, Organic Chemistry Laboratory	—	2
TECH 564, Fundamentals of CAD/CAE	—	3
	16	16
Third Year		
CIE 642, Fluid Mechanics	4	—
CIE 665, Soil Mechanics	4	—
ENCV 643, Environmental Sampling and Analysis	3	—
MATH 644, Probability and Statistics	4	—
CIE 633, Systems Analysiswr	—	3
ENCV 645, Fundamental Aspects of Environmental Engineering	—	4
ENCV 742, Solid and Hazardous Waste Engineering	—	3
General Education Elective	—	4
ESCI 710, Groundwater Hydrology	—	4
	15	18
Summer		
Environmental Engineering Experience+ (ENCV 696 or 697)		1-2 cr.
Fourth Year		
ENCV 746, Bioenvironmental Engineering Design	4	—
ENCV 749, Water Chemistry	4	-
General Education Elective	4	4
Environmental Engineering Electives***	6	4
ENCV 744, Physicochemical Treatment Design	—	4
ENCV 788, Project Planning and Design	—	4
	18	16

*See page19 for general education requirements.
** Approved list is available in the Department of Civil Engineering office.
*** Approved list is available in the Department of Civil Engineering office. Must take a minimum of 3 ENCV electives totaling at last 10 cr. One ENCV elective course must be from the design category
+ During one summer, it is strongly recommended that majors have a job at an approved level in the environmental engineering field, perform an approved internship in environmental engineering, or conduct a research project under the supervision of a faculty member. A student may receive a 1-cr. field experience or up to 2 cr. for an environmental engineering internship. The internship could be used as an environmental engineering elective, but this would require approval of the faculty.

The general education requirements are listed on page 19. ABET requires that environmental engineers have both depth and breadth in their general education. The College of Engineering and Physical Sciences has designed various two-course sequences to satisfy both the University's general education and the ABET depth requirements. The current list of these courses appears on page 50 of this catalog. There are other course sequences that could satisfy this ABET requirement, but the student is required to submit a petition for variance which must be approved before such sequences are accepted.

In order to enter the required 600-level ENCV courses (junior year), an ENCV major must have a minimum cumulative 2.00 grade-point average in the following courses: ENCV 520 and 556, CIE 528 and 529, CHEM 403, 404, 545, and 546, MATH 425 and 426, and PHYS 407. Exceptions to these requirements are granted only under unusual circumstances and require written approval of a petition.

All ENCV 600- and 700-level courses are intended for ENCV and CIE majors only. Non-majors may enter these courses only with permission of the instructor. Non-majors are limited to a maximum of 20 credits of 600- and 700-level ENCV and CIE courses.

Transfers into the ENCV major should have a minimum cumulative grade-point average of 2.30 and have taken at least 16 credit (four courses or more) of math, physics, chemistry, and civil and environmental engineering courses with a minimum grade-point average of 2.0. In addition, 16 credits of these courses must exhibit a grade-point average of 2.50 or better. Students transferring into the department may transfer up to a maximum of 20 credits of ENCV or CIE 600- or 700-level coursework. Grades in the transferred courses must be C- or better.

No ENCV major may repeat more than two ENCV or CIE courses. Any ENCV major who receives lower than a 2.00 grade-point average for more than two consecutive semesters may not continue as an ENCV major. Any ENCV major who receives lower than a 2.00 cumulative grade-point average in ENCV and CIE courses during any three semesters may not continue as an ENCV major.

The ENCV program requires a minimum of 132 total credits for graduation. To qualify for graduation, an ENCV major must: have satisfied the previously specified course requirements, have satisfied the University's general education requirements, have a minimum cumulative grade-point average of 2.00, and have a minimum ENCV and CIE cumulative grade-point average of 2.00.

Computer Science

(For descriptions of courses, see page 138.)

Computer scientists are concerned with all aspects of the design, implementation, and application of computers. They are concerned with problem solving in general, with particular emphasis on the design of computer-efficient solutions. This involves detailed understanding of the nature of algorithms, the software implementation techniques necessary to utilize these algorithms on computers, and a knowledge of how algorithms can be combined in a structured manner to form highly complex software systems.

The program leads to a B.S. in computer science and is designed to prepare students for employment in the computer field or to pursue graduate study in computer science. The program emphasizes the application of computer science theory and principles but also includes a broad background in basic mathematics and an introduction to computer hardware. Most courses require heavy use of the computer, and the laboratories stress hands-on experience with computer equipment.

Computer science majors must obtain an overall grade-point average of 2.00 or better in all required computer science, mathematics, and electrical engineering courses in order to graduate. If at the end of any semester, including the first, a student's cumulative average in these courses falls below 2.00, the student may not be allowed to continue as a CS major.

All students wishing to transfer into a computer science major must have completed at least one full year of calculus (MATH 425 and MATH 426) and one full year of computer science (CS 415 and CS 416). The student must receive a grade of at least C+ in each of these four courses. In addition, the student must achieve a grade-point average of 3.0 in these two mathematics courses and a grade-point average of 3.0 in these two computer science courses. The student must also have an overall grade-point average of 2.0 or better in all courses taken at UNH.

If a student wishing to transfer into a computer science major has taken any other courses that are applicable to the computer science major, the grades in those courses must satisfy the minimum requirements for the BS degree in computer science. (A student is not normally expected to have taken such courses prior to requesting the transfer.)

Requirements

1. Satisfy general education requirements. PHYS 407-408, MATH 425, and PHIL 424 are required and may be used to fulfill requirements in the appropriate general education group.

2. Two additional technology or science courses, one of which may satisfy a general education requirement, chosen from the following list:

Biology
BIOL 411, Principles of Biology I
BIOL 412, Principles of Biology II
HMP 501, Epidemiology and Community Medicine
MICR 501, Public Health Microbiology
PBIO 412, Introductory Botany
PBIO 421, Concepts of Plant Growth
ZOOL 412, Principles of Zoology

Physical Science
CHEM 401-402, Introduction to Chemistry
CHEM 403-404, General Chemistry
CHEM 405, General Chemistry
ESCI 409, Environmental Geology
ESCI 450, Introduction to the Earth Sciences
ESCI 501, Introduction to Oceanography
WARM 504, Freshwater Resources

Technology
ESCI 405, Global Environmental Change
PHIL 447, Computer Power and Human Reason

Also acceptable are sections of the INCO 404, Honors Seminar that the University designates as fulfilling a category 3 general education requirement

3. Two additional approved courses chosen from the humanities, social sciences, and arts.

4. Ten core courses in each of which the student must obtain a grade of C or better. Before taking a course having any of these ten courses as a prerequisite, the prerequisite course(s) must be passed with a grade of C or better: CS 415 and 416, Introduction to Computer Science I and II; CS 515, Data Structures; CS 610, Operating System Fundamentals; CS 611, Assembly Language Programming and Machine Organization, CS 671, Programming Language Concepts and Features; MATH 425 and MATH 426, Calculus I and II; MATH 531, Mathematical Proof, MATH 532, Discrete Mathematics.

5. One computer science theory course chosen from CS 658, Analysis of Algorithms, or CS 659, Introduction to the Theory of Computation.

6. Three approved computer science courses chosen from CS courses numbered above 650.

7. One approved course chosen from CS courses numbered above 650 or from the following list of mathematics courses: MATH 645, Linear Algebra for Applications; MATH 761, Abstract Algebra; MATH 776, Logic; MATH 783, Set Theory.

8. One course in probability and statistics. MATH 644, Probability and Statistics for Applications.

9. Two electrical engineering courses: EE 543, Introduction to Digital Systems, and EE 612, Computer Organization.

Earth Sciences

(For descriptions of courses, see page 142.)

The courses offered in the Department of Earth Sciences cover the broad spectrum of earth sciences, with emphases on geology, hydrology, geochemistry, and oceanography. The curriculum encompasses a group of related studies concerned with an understanding of the Earth: its size, shape, and constitution; the processes that are now, or have formerly been, at work upon its surface, including tectonic cycles, ocean currents, the hydrologic cycle, energy flows, biogeochemical cycles, and climate changes; and the origin and evolution of life. Studies in these areas are based on a foundation of basic mathematics, physics, and chemistry.

The need for people trained in the earth sciences has been increasing in response to society's growing concern with sound environmental and resource management, including the disposal of waste on land and in the atmosphere and oceans; the management of water resources; the development of energy and mineral resources; and the assessment of environmental hazards. In addition, the demand for well-trained secondary school teachers of earth sciences has been steadily increasing.

Four undergraduate degree programs are offered through the Department of Earth Sciences. These programs prepare students for advanced study in the geosciences; for entry-level professional employment in public or private institutions concerned with environmental and resource management, including consulting firms, government agencies, energy- and resource-extraction firms, utilities, and nonprofit organizations; and for secondary-school teaching of earth sciences.

Bachelor of Science in Geology

This program represents a strong concentration in the earth sciences and is especially well suited for students who plan to continue their studies in graduate school. Beyond a central core of courses, there is sufficient flexibility in course selection so that students may, in consultation with their academic advisers, orient the program toward a particular facet of the earth sciences (e.g., mineralogy-petrology, oceanography, hydrogeology, geophysics-structural geology, geomorphology-glacial geology, geochemistry, paleontology-stratigraphy). Students are encouraged to attend an off-campus field camp, for which scholarship funds may be available.

Requirements

1. Satisfy the general education requirements.

2. Satisfactorily complete MATH 425 and 426, CHEM 403-404 (or CHEM 405), and PHYS 407-408 and 505 or ESCI 658. Some of these courses may also satisfy Group 2 and part of Group 3 of the general education requirements.

3. Complete a minimum of twelve courses in earth sciences, which should include ESCI 401, Principles of Geology, *or* ESCI 409, Environmental Geology; ESCI 402, Earth History; ESCI 501, Introduction to Oceanography; ESCI 512, Principles of Mineralogy, ESCI 614, Optical Mineralogy and Petrography, ESCI 530, Field Methods;

ESCI 631, Structural Geology; ESCI 561, Surficial Processes; ESCI 652, Paleontology; and three approved earth sciences 700-level electives.

4 Complete four approved electives. The following should be considered: one additional 700-level course in the earth sciences; additional courses in mathematics, chemistry, and physics; as well as courses in computer science, engineering, and the biological sciences; and an off-campus field camp.

Bachelor of Science in Hydrology

The hydrology major provides a sound foundation for understanding and managing fresh-water resources. It prepares students for entry-level professional employment in firms and agencies and for graduate study.

The hydrology major is an interdisciplinary major offered by the departments of earth sciences and civil engineering. Each hydrology major is assigned to an adviser, who helps with course selection and provides general guidance.

University General Education Requirements:
Students are required to complete the University general education requirements. Completion of the hydrology core curriculum automatically satisfies the requirement for one course in quantitative reasoning (Group 2) and two physical science courses in Group 3. To complete the requirements in Group 3, hydrology majors must take one of the following biological science courses: PBIO 412, PBIO 421, ENTO 402, WILD 433, or ZOOL 412.

Core Courses
MATH 425, 426, 527; MATH 644 or BIOL 528; PHYS 407-408; CIE 642; CHEM 403-404 (or CHEM 405); CS 410C or F; ESCI 401 or 409, 512, 530, 561; CIE 642; ESCI 703 or CIE 741, ESCI 705, 710; two of the following: CIE 743, 745, or ESCI 747.

Major Electives
Three approved electives are to be selected with the guidance of the adviser. Qualifying courses may be selected from a list of hydrogeology, biohydrology, water quality, fluid flow, water resources management, and weather and climate courses offered in various departments in the University.

For a list of the elective courses and for further information about the hydrology major, contact the coordinator, S. Lawrence Dingman, Department of Earth Sciences.

Bachelor of Arts in Earth Sciences

This program offers students an opportunity to obtain a broad liberal education and a general background in earth sciences with a greater degree of freedom in choosing electives than in the bachelor of science program. By a careful choice of electives, students can prepare for graduate school, business, or industry.

Requirements

1. Satisfy the general education requirements.
2. Satisfy the bachelor of arts degree requirements (page 20).
3. Complete a minimum of eight courses in the department (with a C– or better), including ESCI 401, Principles of Geology I, or ESCI 409, Environmental Geology; ESCI 402, Earth History; ESCI 405, Global Environmental Change; ESCI 512, Principles of Mineralogy; and five upper-level earth sciences courses, two of which must be 700 or above.
4. Math requirements: 425, Calculus I, and 426, Calculus II.

It is strongly advised that students complete, as early as possible, a year each of college chemistry and physics.

Bachelor of Arts in Earth Science Teaching

This program is specifically designed to prepare students to teach earth sciences in secondary school. Upon graduation from this program, students receive full teacher certification which is recognized in most states.

Requirements

1. Satisfy the general education requirements.
2. Satisfy the bachelor of arts degree requirements (page 20).
3. Complete the following: ESCI 401, Principles of Geology I, or ESCI 409, Environmental Geology; ESCI 402, Earth History; ESCI 405, Global Environmental Change; ESCI 501, Introduction to Oceanography; GEOG 473, The Weather, CHEM 403-404, General Chemistry; PHYS 401-402, Introduction to Physics I and II; PHYS 406, Introduction to Modern Astronomy; plus 12 approved elective credits from intermediate and/or advanced earth sciences courses.
4. Math requirements: 425, Calculus I, and 426, Calculus II.
5. Satisfy the secondary-school teacher education program. (See page 34.)

General Science Certification

See pages 34 and 84.

Electrical Engineering

(For descriptions of courses, see page 147.)

The Department of Electrical and Computer Engineering offers an accredited program in electrical engineering. Within this program, students may choose options in computer engineering or signals and systems. Additional information can be found at the ECE Web site: http://www.ece.unh.edu

Electrical engineers are concerned with the design, development, and production of products and systems that involve electrical signals. Thus, broad areas of application are covered, such as monitoring the environment, outer space and the ocean floor, developing robots for factories and biomedical instruments for hospitals, and building microcomputers and power systems. They use such principles and techniques as computer-aided design, optics, acoustics, electronics, automatic control theory, and electromagnetics. Further, it is essential for electrical and computer engineers to include in their work a variety of realistic constraints, such as economic factors, safety, reliability, aesthetics, ethics, social implications, and environmental impact.

Electrical engineering graduates readily move into design, product development, manufacturing, sales and marketing, customer application support, and business management roles within prominent computer and electronic system companies. They routinely secure professional positions with the nation's leading computer and network hardware and software firms, wireless communication and telecommunication providers, medical electronic industries, and custom integrated circuit developers. The strength of the electrical engineering program is such that many graduates successfully complete advanced degrees in engineering and business at top-ranked graduate schools, while others have gone on to obtain law or medical degrees.

At UNH, the cornerstone of the electrical engineering program is the involvement of students in the solution of real-world problems. During the freshman and sophomore years, student take basic courses in mathematics and science, learn how to use computers, and receive introductory experience in electric circuits, logic design, electronics, computer organization, and random processes. Building upon this foundation, students in the junior year develop core competencies in electronics, signal processing and control systems, computer engineering, and electromagnetics. In the senior year, students select professional elective courses to acquire both breadth and depth in specific areas of electrical engineering.

In addition to general University requirements, the department has a number of grade-point average and credit requirements:

1. For an electrical engineering major to enter the junior year and take any of

the first-term junior courses (EE 544, EE 617, EE 633, EE 651, or EE 690), he or she must have taken, and achieved a cumulative grade point average of 2.10 in, all of the following freshman and sophomore courses: MATH 425, 426, 527; PHYS 407, 408; and EE 541, 543, 548, 612, and 647.

2. Any electrical engineering major whose cumulative grade-point average in EE courses is less than 2.00 during any three semesters will not be allowed to continue as an electrical engineering major.

3. Electrical engineering majors must achieve a 2.00 grade-point average in EE courses as a requirement for graduation.

To make an exception to any of these departmental requirements based on extenuating circumstances, students must petition the department's undergraduate committee. Students should also be aware of the CEPS requirement for a two-course sequence in their general education requirements in order to provide depth. Mindful of these rules, students, with their advisers' assistance, should plan their programs based on the distribution of courses in the chart below for a total of at least 128 credits.

Basic Curriculum for B.S. in Electrical Engineering
(First three years are common to all options.)

Freshman Year Core Courses	Fall	Spring
MATH 425, Calculus I	4	—
PHYS 407, General Physics I	4	—
EE 401, Perspectives in Electrical and Computer Engineering	4	—
Elective, General Education	4	—
MATH 426, Calculus II	—	4
PHYS 408, General Physics II	—	4
CS 410, Introduction to Scientific Programming	—	4
General Education: Writing***	—	4
Total	16	16

Sophomore Year Core Courses	Fall	Spring
EE 541, Electrical Circuits	4	—
EE 543, Introduction to Digital Systems	4	—
MATH 527, Differential Equations with Linear Algebra	4	—
CHEM 405, General Chemistry*	4	—
EE 548, Electronic Design I	—	4
EE 612, Computer Organization	—	4
EE 647, Random Processes and Signals in Engineering	—	4
ME 523, Introduction to Statics and Dynamics	—	3
Total	16	15

Junior Year Core Courses	Fall	Spring
EE 617, Junior Laboratory I	2	—
EE 651, Electronic Design II	4	—
EE 633, Signals and Systems I	3	—
EE 690, Engineering Design Principles I	.5	—
EE 544, Engineering Analysis	3	—
Elective, General Education	4	—
EE 618, Junior Laboratory II		2
EE 603, Electromagnetic Fields and Waves I	—	3
EE 634, Signals and Systems II	—	4
EE 691, Engineering Design Principles II	—	.5
EE 707, Computer Engineering	—	4
Elective, General Education	—	4
Total	16.5	17.5

Senior Year	Fall	Spring
Professional Elective**	4	—
Professional Elective**	4	—
Elective, General Education	4	—
Elective, General Education	4	—
EE 790, Engineering Design Experience	—	0
Professional Elective**	—	4
Professional Elective**	—	4
Elective, General Education	—	4
Free Elective	—	3
Total	16	15

*CHEM 403-404 may be required for students whose preparation in chemistry is inadequate.

** Professional electives normally consist of 700-level EE courses. Each course must carry at least three credits, and no more than one can be an independent study, special topics, or project course. Alternatives are courses specified by (1) an established option, or (2) a student-designed plan approved by the ECE Undergraduate Committee.

*** See page 50 for requirements.

Options and Minors

In the junior year, students complete the core courses and may begin studying in a chosen option. Students may choose an option and additionally may elect one of the various minors (see page 51). The options, described in the following paragraphs, provide for professional electives so that students may pursue their individual interests. In addition, the senior year features many opportunities for individual or group projects.

Computer Engineering Option

Because of the continued improvement of the price/performance ratio of computers, they have become embedded in virtually every electrical engineering system. Computer engineering, traditionally a subset of electrical engineering, is a rapidly growing field that emphasizes the design, interfacing, hardware/software tradeoffs, and real-time application of computers. Students who elect this option will gain a knowledge of both hardware and software concepts, and will learn to design, build, and test systems containing digital computers.

The student must take twenty credits in a program approved by the Computer Engineering Option adviser. Requirements include taking and passing the following: (1) EE 707; (2) three courses from the following two groups, with at least one course from each group: Group A: EE 711, EE 715, EE 717; Group B: EE 714, CS 512, CS 610, any CS 7xx course; (3) a computer-related course approved by the Computer Engineering Option adviser; (4) a computer-related senior project.

Signals and Systems Option

Modern electronic and computer-controlled products (e.g., CD players, cellular phones and pagers, medical diagnostic imaging systems, anti-skid automotive braking systems) are made possible only by the complex processing of voice, video, and sensor signals. The design of advanced communication, control, and signal processing systems is at the heart of the "information revolution" sweeping through society. The signals and systems option enables students to concentrate their studies on this exciting area where computer, communication, and control concepts converge.

The student must take twenty credits in a program approved by the Signals and Systems Option Adviser. Requirements include taking and passing the following: (1) EE 634; (2) EE 757; (3) EE 772; (4) one course from the following group: EE 711, EE 714, EE 717; (5) any other EE 700-level course; and (6) a signals and systems-related senior project.

Environmental Engineering

(For descriptions of courses, see page 156.)

Note: Pending approval of the Board of Trustees, the College of Engineering and Physical Sciences will offer two programs of study leading to the Bachelor of Science Degree in Environmental Engineering.

One program is designed and administered within the Department of Chemical Engineering; the details of that pro-

gram are described on page 54. The other program is designed and administered by the Department of Civil Engineering; the details of that program are described on page 57. The differences in the programs are reflected in the differences of the fundamental perspectives of the disciplines and in the sample programs of courses provided within the program descriptions.

The environmental engineering major, if approved, will be new as of academic year 1999–2000 and may not seek accreditation until 2002. Accreditation, once granted by the Accreditation Board for Engineering and Technology (ABET), will be retroactive to all graduates.

Engineering Technology

(For descriptions of courses, see page 148.)

Engineering technology requires the application of engineering and scientific knowledge and methods combined with technical skills in support of engineering activities. Normally engineering technology is not concerned with the development of new principles and methods. The engineering technology program offers only junior- and senior-level work. Students admitted to this program must have an appropriate associate's degree from the New Hampshire Technical Institute, the Vermont Technical College, Keene State College, or an equivalent T.A.C.-A.B.E.T.–accredited institution or evidence of ability to successfully complete the requirements of the program. Curricula in electrical engineering technology and mechanical engineering technology are offered. Students may continue study in their fields of specialization, select electives that broaden their educational backgrounds, and participate in project courses where, as part of a technology team, their talents are applied in solving real problems. Engineering Technology students can elect to complete a minor in lighting. Interested students should request the separate brochure describing this minor.

Students interested in an engineering technology program may consult with the program chairperson, Ralph W. Draper, 138 Parsons Hall, (603) 862-1827.

Electrical Engineering Technology

Junior Year	Fall	Spring
ET 630, Analytical Methods in Engineering Technology	2	—
ET 637, Heat and Fluid Power I or ET 762, Illumination Engineering	4	—
ET 671, Digital Systems	—	4
ET 674, Control Systems and Components	—	4
ET 677, Analog Systems or ET 675, Electrical Technology-cs opt	4	—
Technical electives (2)	4	4
Electives (2)	4	4
Total	18	16

Senior Year	Fall	Spring
ET 733, Business Organization and Law	—	4
ET 734, Economics of Business Activities	4	—
ET 791, Electrical Engineering Technology Project	4	4
Technical electives (2)	4	3 or 4
Electives (3)	4	8
Total	16	19 or 20

Technical Electives

Electrical/Electronics Option

CS 410C, Introduction to Scientific Programming	4
ET 680, Communications and Fields	4
ET 763, Lighting Design and Applications	4
ET 783, Advanced Electronic Design Methods	4
ET 790, Microcomputer Technology	4

Computer Science Option (pick 4)

CS 415, Introduction to Computer Science I	4
CS 416, Introduction to Computer Science II	4
CS 515, Data Structures and Algorithms	4
CS 610, Operating System Fundamentals	4
CS 658, Analysis of Algorithms	4
CS 659, Introduction to the Theory of Computation	4
CS 671, Programming Language Concepts and Features	4
CS 727, Computer Communications Software Design	4
CS 730, Introduction to Artificial Intelligence	4
CS 770, Computer Graphics	4

All students entering the electrical engineering technology program should have a minimum of 12 credits of college-level mathematics, including two semesters of calculus. Students without this background will be required to take either MATH 426, 527, or 644, during the first semester of their junior year. The student's adviser will determine which of these courses is most appropriate for the student's program. Electrical engineering technology students must also complete a minimum of 9 credits of course work in communication skills. Computer science technical electives are contingent on space availability and the appropriate prerequisites being satisfied

Mechanical Engineering Technology

Junior Year	Fall	Spring
ET 630, Analytical Methods in Technology	2	—
ET 637 and 638, Heat and Fluid Power I and II	4	4
ET 641, Production Systems	3	—
ET 644, MET Concepts in Design and Analysis *or* ET 649, Production Tooling and Processes	—	4
ET 675, Electrical Technology	4	—
CS 410, Introduction to Scientific Programming *or:* ET 750, Computer Integrated Manufacturing	—	4
Electives (2)	4	4
Total	17	16

Senior Year	Fall	Spring
ET 674, Control Systems and Components	—	4
ET 733, Business Organization and Law	—	4
ET 734, Economics of Business Activities	4	—
ET 745, Instrumentation *or* ET 762, Illumination Engineering	4	—
ET 751, Mechanical Engineering Technology Project	4	4
Electives (3)	4	8
	16	20

All students entering the mechanical engineering technology program should have a minimum of 12 credits of college-level mathematics, including two semesters of calculus. Students without this background will be required to take either MATH 426, 527, or 644 during the first semester of their junior year. The student's adviser will determine which of these courses is most appropriate for the student's program.

All mechanical engineering technology students must satisfactorily complete CHEM 403 or offer evidence of equivalent coursework. Students in this program must also complete a minimum of 9 credits of courses in communication skills.

Mathematics

(For descriptions of courses, see page 181.)

A variety of programs is offered by the Department of Mathematics. These programs provide flexibility through elective choices and are designed to maximize educational and employment opportunities.

Each student must enroll in one specific program; however, changes between programs can usually be accommodated.

The first two years of all programs are similar. In the first year, students are expected to take MATH 425 and 426 as well as an introductory computer science course (either CS 410, Introduction to Scientific Programming, or CS 415-416,

Introduction to Computer Science I and II). In the sophomore year MATH 527, 528, 531, and/or 545 keep a student on schedule in most programs. General education courses will normally be completed by the end of the sophomore year.

In addition to its degree programs, the department has an active interest in the actuarial profession and is an examination center for the Society of Actuaries. Recommended courses for those interested in actuarial science can be included in any of the degree programs.

The department has created a Web site featuring more information about its undergraduate programs (http://www.math.unh.edu/pub/undergrad).

Standards for Graduation

To be certified for graduation with a degree from the Department of Mathematics, a student must complete all courses used to satisfy the requirements for the specific major program with a grade of C- or better and have an overall grade-point average of 2.0 in these courses. The student must remain in good standing within the defined requirements of the University.

In extenuating circumstances a student may petition for a variance in academic policy, including changes in program requirements by submitting the standard UNH form for this purpose with his/her adviser, who will then forward the petition to the department's Undergraduate Program Committee for consideration. If the Committee approves the petition, it is forwarded to the CEPS Dean's Office for further action.

Bachelor of Arts, Mathematics Major

This program offers a broader liberal arts education than the bachelor of science programs. By a careful selection of electives, students can shape this major into a preparation for graduate school, business, or industry.

Requirements

General education requirements (Math 425 satisfies the Group 2 requirement, quantitative reasoning.)
Foreign language requirement as defined by the University for the B.A. degree.

Required MATH/CS courses
CS 410, Introduction to Scientific Programming
MATH 425-426, Calculus I and II
MATH 527, Differential Equations with Linear Algebra
MATH 528, Multidimensional Calculus
MATH 531, Mathematical Proof *or* 545, Introduction to Linear Algebra
MATH 639, Introduction to Statistical Analysis
MATH 761, Abstract Algebra
MATH 762, Linear Algebra
MATH 767, One-Dimensional Real Analysis
Two approved MATH or CS electives chosen in consultation with adviser.

Bachelor of Science in Mathematics

This program offers the strongest concentration in mathematics, requiring courses that are intended to prepare the student for graduate work in mathematics. Through a judicious choice of electives, students may design a stronger pregraduate program or slant the program toward a career in business or industry.

Requirements

General education requirements (MATH 425 satisfies the Group 2 requirement, quantitative reasoning.)*
Foreign language requirement as defined by the University for the B.A. degree in Russian, German, or French.
Other required courses
PHYS 407-408, General Physics I and II (satisfies two of the three courses for general education in Group 3, biological science, physical science, and technology)

Required MATH/CS courses
CS 410, Introduction to Scientific Programming
MATH 425-426, Calculus I and II
MATH 527, Differential Equations with Linear Algebra
MATH 528, Multidimensional Calculus
MATH 531, Mathematical Proof *or* 545, Introduction to Linear Algebra
MATH 639, Introduction to Statistical Analysis
MATH 761, Abstract Algebra
MATH 762, Linear Algebra
MATH 767, One-Dimensional Real Analysis
MATH 784, Topology
MATH 788, Complex Analysis
One approved MATH elective chosen in consultation with adviser
One approved MATH or CS elective chosen in consultation with adviser.

Bachelor of Science in Mathematics Education

This professional degree program prepares students for mathematics teaching at the elementary, middle/junior high, or secondary level. The program is coordinated with the education department's teacher certification programs. For the elementary option, full certification requires the five-year program. Students may complete the degree requirements for middle/junior high or secondary option with full teacher certification in either four or five years. Students electing the four-year option must plan for one semester of student teaching (EDUC 694) in their senior year and should consult with the mathematics department program adviser concerning the schedule of mathematics courses. The five-year program involves a required yearlong teaching internship in the fifth year. (The internship can be coupled with other graduate work leading to a master's degree.) See Education, page 34.

Elementary Option

Requirements

General education requirements (MATH 425 satisfies the the Group 2 requirement, quantitative reasoning.)*
Required mathematics courses
MATH 425-426, Calculus I and II
MATH 531, Mathematical Proof
MATH 545, Introduction to Linear Algebra
MATH 619, Historical Foundations of Mathematics
MATH 621, Number Systems for Teachers
MATH 622, Geometry for Teachers
MATH 623, Topics in Mathematics for Teachers
MATH 639, Introduction to Statistical Analysis
MATH 645, Linear Algebra for Applications
MATH 657, Geometry
MATH 703, The Teaching of Mathematics, K–6
MATH 791, The Teaching of Mathematics, 7–12
One approved MATH elective chosen in consultation with adviser.

Other required courses
CS 410, Introduction to Scientific Programming
PHYS 406, Introduction to Modern Astronomy (satisfies one of three courses for general education in Group 3, biological science, physical science, and technology)
EDUC 500, Exploring Teaching
EDUC 700, Educational Structure and Change
EDUC 701, Human Development and Learning: Educational Psychology
EDUC 705, Alternative Perspectives on the Nature of Education
EDUC 706, Introduction to Reading Instruction in the Elementary Schools

Middle/Junior High School Option

Requirements

General education requirements (MATH 425 satisfies the Group 2 requirement, quantitative reasoning.)*

Required mathematics courses
MATH 425-426, Calculus I and II
MATH 531, Mathematical Proof
MATH 545, Introduction to Linear Algebra
MATH 619, Historical Foundations of Mathematics
MATH 621, Number Systems for Teachers
MATH 622, Geometry for Teachers
MATH 639, Introduction to Statistical Analysis
MATH 645, Linear Algebra for Applications
MATH 657, Geometry
MATH 698, Senior Seminar
MATH 761, Abstract Algebra
MATH 791, The Teaching of Mathematics, 7–12
One approved MATH elective chosen in consultation with adviser.

Other required courses
CS 410, Introduction to Scientific Programming

*CS 401, 403, and 505 may not be taken for credit in any program in mathematics.

EDUC 500, Exploring Teaching
EDUC 700, Educational Structure and Change
EDUC 701, Human Development and Learning: Educational Psychology
EDUC 705, Alternative Perspectives on the Nature of Education

Secondary Option
Requirements
General education requirements (MATH 425 satisfies the Group 2 requirement, quantitative reasoning.)*

Required mathematics courses
MATH 425-426, Calculus I and II
MATH 527, Differential Equations with Linear Algebra
MATH 528, Multidimensional Calculus
MATH 531, Mathematical Proof
MATH 545, Introduction to Linear Algebra
MATH 619, Historical Foundations of Mathematics
MATH 639, Introduction to Statistical Analysis
MATH 657, Geometry
MATH 698, Senior Seminar
MATH 761, Abstract Algebra
MATH 791, The Teaching of Mathematics, 7–12
One approved MATH elective chosen in consultation with adviser.

Other required courses
CS 410, Introduction to Scientific Programming
EDUC 500, Exploring Teaching
EDUC 700, Educational Structure and Change
EDUC 701, Human Development and Learning: Educational Psychology
EDUC 705, Alternative Perspectives on the Nature of Education

Bachelor of Science: Interdisciplinary Programs in Mathematics and Its Applications

The interdisciplinary programs in mathematics prepare students for employment in areas of applied mathematics. Some of them can lead to graduate work in appropriate fields (e.g., physics, computer science, economics). The major may consist of mathematics combined with computer science, economics, electrical science, physics, or statistics,

Each interdisciplinary major consists of ten mathematics courses plus at least six courses in the discipline of the option. Specific requirements follow.

Requirements
General education requirements (MATH 425 satisfies the Group 2 requirement, quantitative reasoning.)*

Required courses in all options
MATH 425-426, Calculus I and II
MATH 527, Differential Equations with Linear Algebra
MATH 528, Multidimensional Calculus
MATH 531, Mathematical Proof *or* 545, Introduction to Linear Algebra
MATH 639, Introduction to Statistical Analysis
MATH 645, Linear Algebra for Applications
CS 410, Introduction to Scientific Programming, *or* CS 416, Introduction to Computer Science II
If Math 545 is taken, credit may not be received for Math 645. Instead, students should take another mathematics course chosen in consultation with their adviser.

Other required courses by option
Computer Science Option:
MATH 532, Discrete Mathematics
MATH 753, Introduction to Numerical Methods
One additional MATH course chosen from approved electives.

CS 415-416, Introduction to Computer Science I and II
CS 515, Data Structures and Algorithms
EE 543, Introduction to Digital Systems
CS 610, Operating System Fundamentals
CS 611, Assembly Language Programming and Machine Organization
CS 658, Analysis of Algorithms, *or* CS 659, Introduction to the Theory of Computation
One additional CS course chosen in consultation with adviser.

Economics Option:
MATH 739, Regression Analysis
One MATH course chosen from: MATH 740, 741, 742, 755
One additional MATH course chosen from approved electives

ECON 401, Principles of Economics (Macro)
ECON 402, Principles of Economics (Micro)
ECON 605, Intermediate Microeconomic Analysis
ECON 611, Intermediate Macroeconomic Analysis
DS 632, Operations Research
One additional ECON or DS course

Electrical Science Option
MATH 646, Analysis for Applications
MATH 647, Complex Analysis for Applications
MATH 753, Introduction to Numerical Methods

EE 541, Electrical Circuits
EE 548, Circuits and Electronics
EE 603, Electromagnetic Fields and Waves I
EE 633, Signals and Systems I
EE 757, Fundamentals of Communication Systems
EE 771, Linear Systems and Control

Physics Option
MATH 646, Analysis for Applications
MATH 647, Complex Analysis for Applications
MATH 753, Introduction to Numerical Methods

PHYS 407, 408, 505, Physics I-III
Three additional PHYS courses, chosen from the following seven courses:
PHYS 508, Thermodynamics and Statistical Mechanics
PHYS 616, Physical Mechanics
PHYS 701, 702, Introduction to Quantum Mechanics I, II
PHYS 703, 704, Electricity and Magnetism I, II
PHYS 708, Optics

Statistics Option
MATH 739, Regression Analysis
MATH 755, Probability and Stochastic Processes
MATH 756, Principles of Statistical Inference
Two additional MATH courses chosen from
MATH 740, Industrial Statistics and Design of Experiments
MATH 741, Biostatistical Methods
MATH 742, Multivariate Statistics and Modern Regression Analysis
Three additional MATH courses chosen in consultation with adviser.

Minoring in Mathematics

The Department of Mathematics offers three options for minor programs. These are open to all students enrolled at the University. Each option requires a minimum of five courses as detailed below. (These requirements assume that the student has credit for M425 and M426, or their equivalents.) Students whose major program requires by specific course number more than 8 credit hours in courses required by the departmental minor may substitute additional courses from the list of optional courses in the minor to meet the five course minimum.

Mathematics Minor:
Required (3): Math 528, Math 531 or 545, and Math 761 or 767
Options (2): Two courses chosen from among Math 527, 656, 657, 658, 761, 762, 764, 767, 776, 783, 784, 788

Applied Mathematics Minor:
Required (4): Math 527, 528, 545 or 645, and 753
Options (1): One course chosen from among Math 639 or 644, 646, 647, 745, 746, 747, 754

Statistics Minor:
Required (2): Math 639 or 644, and Math 545 or 645
Options (3): Three courses chosen from among Math 739, 740, 741, 742, 755, 756

Mechanical Engineering

(For descriptions of courses, see page 183.)

Mechanical engineering is a challenging profession encompassing research, design, development, and production of aerospace vehicles, underwater vessels, instrumentation and control systems, nuclear and conventional power plants, and consumer and industrial products in general. The profession also makes contributions through more fundamental studies of material behavior, the mechanics of solids and fluids, and energy transformation. Additional information can be found at the mechanical engineering Web site: http://www.unh.edu/mechanical-engineering/index.html

The mechanical engineering program develops the student's creative potential to meet the increasingly complex needs of industry, government, and education while giving an appreciation of the role of technology in a modern society.

The curriculum prepares prospective graduates either for more advanced studies or for beginning professional engineering careers. It provides a foundation of knowledge in the basic physical sciences, mechanics of solids and fluids, dynamic systems, thermal sciences, materials science, and design. Students develop abilities in analysis, experimentation, and design. Elective courses allow students to gain additional competence in any of these specific areas. Other elective courses in the arts, humanities, and the social sciences are included to provide a liberal education.

Students, with their advisers' assistance, should plan a program based on the following distribution of courses that totals not less than 128 credits. The outline that follows is to be considered as being typical only in format. Within the constraints of satisfying all of the requirements and having all the necessary prerequisites, schedules may vary because of scheduling needs or student preference. Some mechanical engineering elective courses may not be offered every year.

The curriculum has thirteen elective courses. These should be selected in consultation with a departmental adviser to lead to a balanced program that addresses chosen areas of interest. Five of the elective courses are selected from groups four through eight of the University's general education requirements, with the Group 7 general education course being either ECON 402 or EREC 411. One of the elective courses must be selected from the biological science listing of Group 3 of the general education requirements. Seven technical elective courses of at least 3 credits each are required. Three of the seven technical electives must come from the prescribed lists: A. engineering practice; B. mathematics; C. advanced engineering topics. These lists are available in the mechanical engineering office. All students must take one course from each list. Two of the remaining four technical electives can be used for studying a focused area such as a foreign language, or a preprofessional program, or a minor, with mechanical engineering department approval. Some programs may require additional elective courses to reach the minimum of 128 credits required for graduation. Other programs may exceed 128 credits to include all the required courses.

To enter the junior-year courses in the mechanical engineering major, students must have at least a 2.00 combined grade-point average for the following group of courses: PHYS 407-408, ME 503, ME 525, and ME 526.

In order to graduate in the mechanical engineering major, students must have at least a 2.00 grade-point average in all engineering and science courses, including required technical electives normally taken as department requirements after the start of the junior year. The option of repeating required engineering, science, and technical elective courses normally taken after the start of the junior year may be exercised in only one of the following: (1) one course may be repeated twice; and (2) a maximum of two courses may be repeated once.

Freshman Year	Fall	Spring
MATH 425, Calculus I	4	—
MATH 426, Calculus II	—	4
ME 441, Engineering Graphics	4	—
General Education Elective	4	—
General Education Elective	4	—
ENGL 401, Freshman English	—	4
CHEM 405, General Chemistry	—	4
PHYS 407, General Physics I	—	4
	16	16
Sophomore Year		
MATH 527, Differential Equations with Linear Algebra	—	4
MATH 528, Multidimensional Calculus	4	—
ME 525, 526, Mechanics I and II	3	3
ME 503, Thermodynamics	—	3
ME 561, Introduction to Materials Science	—	4
PHYS 408, General Physics II	4	—
Technical elective**	3–4	—
General education elective	4	4
	18–19	18
Junior Year		
CS 410, Introduction to Scientific Programming	4	—
ME 608, Fluid Dynamics	3	—
ME 603, Heat Transfer	—	3
ME 627, Mechanics III	3	—
ME 643, Elements of Design	—	3
ME 646, Experimental Measurement and Data Analysis	—	4
EE 537, Introduction to Electrical Engineering	4	—
ME 670, Systems Modeling, Simulation, and Control	—	4
Technical electives (2)**	3–4	3–4
	17–18	17–18
Senior Year		
ME 705, Thermal System Analysis and Design	4	—
ME 755, Senior Design Project I	2	—
ME 756, Senior Design Project II	—	2
ME 747, Experimental Measurement and Modeling of Complex Systems	4	—
Technical electives (4)	3–4	9–12
General education electives (2)**	4	4
	17–18	15–18

*CHEM 403-404 may be required for students whose preparation in chemistry is inadequate.
** See page 50 for degree requirements.

Physics

(For descriptions of courses, see page 198.)

Physics is concerned with the properties of matter and the laws that describe its behavior. It is an exact science based on precise measurement, and its objective is the kind of understanding that leads to the formulation of mathematical relationships between measured quantities. As a fundamental science, its discoveries and laws are basic to understanding in nearly all areas of science and technology. Advances in such diverse fields as medical instrumentation, solid state electronics, and space research have relied heavily on the application of basic physical laws and principles.

Students interested in the study of physics at the University of New Hampshire will find a strong interaction between research and academic programs. Undergraduates have participated in research studies ranging from nuclear scattering experiments at major particle accelerators to astrophysical studies of the solar system using space probes. These experiences have proven beneficial to engineering and physics students alike. The department has its own library, which provides a comfortable, inviting atmosphere for study and relaxed reading.

The suggested programs that follow are indicative of the flexibility available to students, whether they are preparing for graduate work in physics, industrial opportunities, governmental research, secondary-level teaching, or a general education that might utilize the fundamental knowledge of physics.

The following undergraduate degree programs are offered through the Department of Physics. Interested students may consult with the department chairperson.

Bachelor of Science in Physics

The bachelor of science degree in physics prepares students for professional work as physicists. The required courses in the standard options are those typically necessary for admission to graduate study in physics. The new interdisciplinary options require fewer physics courses combined with a concentration in another area (chemistry, biology, optics, environmental radiation, or materials science).

Requirements

1. Satisfy general education requirements.
2. Satisfy bachelor of science requirements (page 51).
3. One course in English is required in addition to the University requirement.
4. Minimum physics requirements: 407-408, 505, 508, 605, 615-616, 701, 702, 703, 704, 705; two courses selected from 707, 708, 710, 712, 718, 720.
5. Chemistry: 403-404 or 405.
6. Math: 425-426, 527, 528, 646 (optional); CS 410.
7. By the end of the spring semester of the sophomore year, a student must have a minimum grade of C in each 400- or 500-level course specifically required for the B.S. degree and an overall grade-point average of 2.33 in these courses in order to continue in the B.S. program.

Physics electives

Additional physics courses may be selected from the following: 791, Special Topics; 795, Independent Study.

Suggested Curriculum for B.S. in Physics

Freshman Year	Fall	Spring
PHYS 407-408, General Physics I and II	4	4
MATH 425, 426, Calculus I and II (Group 2)	4	4
CHEM 403-404, General Chemistry (Group 3)	4	4
ENGL 401, Freshman English	—	4
Elective (general education requirement)	4	—
	16	16
Sophomore Year		
PHYS 505, General Physics III	4	—
PHYS 508, Thermodynamics and Statistical Mechanics	—	4
PHYS 615, Introduction to Mathematical Physics	—	4
MATH 527-528, Differential Equations with Multidimensional Calculus	4	4
CS 410, Introduction to Scientific Programming	4	—
English (from Group 8)	—	4
Elective (general education requirement)	4	—
	16	16
Junior Year		
PHYS 605, Experimental Physics I	5	—
PHYS 616, Physical Mechanics	4	—
PHYS 701, Introduction to Quantum Mechanics I	—	4
MATH 646, Analysis for Applications (optional)	—	4
PHYS 703, Electricity and Magnetism I	—	4
Electives (general education requirements)	8	4
	16	16
Senior Year		
PHYS 702, Quantum Mechanics II	4	—
PHYS 704, Electricity and Magnetism II	4	—
PHYS 705, Experimental Physics III	4	—
Physics electives (must take two) (707, 708, 710, 712, 718, 720)	—	8
Elective (free)	4	8
	16	16

Applied Physics Optics Option, Bachelor of Science in Physics

1. Satisfy general education requirements
2. Satisfy bachelor of science requirements
3. One course in English is required in addition to the University requirement
4. Physics requirements: PHYS 407-408; 505, 508, 605, 615, 616, 701, 703, 704, 705, 708 (or EE 761), 795 (senior thesis)
5. Chemistry: CHEM 405
6. Mathematics: MATH 425, 426, 527, 528, 646
7. Computer Science: CS 410
8. Mechanical Engineering: ME 711, 761 (or PHYS 708 or EE 760)

Biophysics Option, Bachelor of Science in Physics

1. Satisfy general education requirements
2. Satisfy bachelor of arts degree requirements
3. One course in English is required in addition to the University requirement
4. Physics requirements: PHYS 407-408; 505, 615, 616, 701, 702 (or approved elective), 703, 704 (or approved elective), 795 (senior thesis)
5. Chemistry: CHEM 405, 545, 546, 683, 684
6. Biology: BIOL 411, 412
7. Biochemistry: BCHM 751, 752, 755
8. Mathematics: MATH 425, 426, 527, 528
9. Computer Science: CS 410

Biophysics Option, Bachelor of Arts in Physics

1. Satisfy general education requirements
2. Satisfy bachelor of arts degree requirements
3. One course in English is required in addition to the University requirement
4. Physics requirements: PHYS 407-408, 505, 605, 615, 616, 701
5. Chemistry: CHEM 405, 545, 683, 684
6. Biology: BIOL 411, 412
7. Biochemistry: BCHM 751, 752, 755
8. Mathematics: MATH 425, 426, 527, 528
9. Computer Science: CS 410

Chemical Physics Option, Bachelor of Science in Physics

1. Satisfy general education requirements
2. Satisfy bachelor of science requirements
3. One course in English is required in addition to the University requirement
4. Physics requirements: PHYS 407-408, 505, 605, 615, 616, 701, 703, 705, 718 (optional), 795 (senior thesis)
5. Chemistry: CHEM 405, 406-407, 547, 548, 549, 574, 550, 683, 684, 685, 686, 762, 763, 776
6. Mathematics: MATH 425-426, 527, 528, 646
7. Computer Science: CS 410

Environmental Radiation Option, Bachelor of Science in Physics

1. Satisfy general education requirements
2. Satisfy bachelor of science requirements
3. One course in English is required in addition to the University requirement
4. Physics requirement: PHYS 407-408, 505, 508, 605, 615, 616, 701, 702, 703, 704, 705, 795 (senior thesis)
5. Chemistry: CHEM 405
6. Chemical engineering: CHE 709, 712
7. Mathematics: MATH 425, 426, 527, 528, 646
8. Computer science: CS 410
9. Biology: BIOL 411, 412, 605

Materials Science Option, Bachelor of Science in Physics

1. Satisfy general education requirements
2. Satisfy bachelor of science requirements
3. One course in English is required in addition to the University requirement
4. Physics requirements: PHYS 407-408, 505, 605, 615, 616, 701, 703, 705, 795 (senior thesis)
5. Chemistry: CHEM 405, 406, 407, 574
6. Mechanical engineering: ME 661, 730, 760, 761 *or* 731, 762
7. Computer science: CS 410
8. Mathematics: MATH 425, 426, 527, 528, 646
9. Chemical engineering: CHE 604, 605

Physics Major, Bachelor of Arts

This degree provides an opportunity for a broad and liberal education, which in some cases may be sufficient for graduate work. A judicious choice of electives may also prepare students for interdisciplinary programs that require proficiency in a restricted area of physics.

Requirements

1. Satisfy general education requirements.
2. Satisfy bachelor of arts degree requirements (page 20).
3. PHYS 407-408, 505, 605, 615, 616, 701, 703, 705. Note that MATH 425, 426, and MATH 527, 528 are prerequisites for some of the courses. A total of 32 credits is required.

Bachelor of Arts, Chemistry and Physics Teaching

For information, see page 55.

School of Health and Human Services

Raymond T. Coward, Dean
Neil B. Vroman, Associate Dean
Carole A. Pierce, Advising Coordinator

Department of Communication Disorders
Department of Family Studies
Department of Health Management and Policy
Department of Kinesiology
Department of Medical Laboratory Science
Department of Nursing
Department of Occupational Therapy
Department of Recreation Management and Policy
Department of Social Work

Bachelor of Science
Communication Disorders
Family Studies
- Child and Family Studies

Health Management and Policy
Kinesiology
- Athletic Training
- Exercise Science
- Outdoor Education
- Physical Education Pedagogy
- Sport Studies

Medical Laboratory Science
- Clinical Chemistry
- Clinical Hematology
- Clinical Immunohematology
- Clinical Microbiology

Nursing
Occupational Therapy
Recreation Management and Policy
- Program Administration
- Therapeutic Recreation

Bachelor of Arts
Social Work

The School of Health and Human Services, established in 1968, was created in response to the growing need for programs in higher education that prepare young men and women for health-related careers. The school offers undergraduate instruction leading to the bachelor of science degree in communication disorders, family studies, health management and policy, kinesiology, medical laboratory science, nursing, occupational therapy, and recreation management and policy. It also offers undergraduate instruction leading to a bachelor of arts degree in social work. Each program enables students to acquire the basic knowledge and skills needed to practice their chosen professions and to obtain a broad cultural background in the humanities and social sciences.

Required Courses
ENGL 401, Freshman English
PSYC 401, Introduction to Psychology
ZOOL 507-508, Human Anatomy and Physiology

Recommended Courses
CHEM 403-404, General Chemistry
COMM 520, Survey of Communication Disorders
FS 525, Human Development
HMP 401, U.S. Health Care Systems
KIN 500, Historical and Contemporary Issues in Physical Education
MLS 401, Introduction to Medical Laboratory Science
NUTR 475, Nutrition in Health and Disease
RMP 490, History and Philosophy of Leisure
SW 524, Introduction to Social Work

Degree Requirements

Candidates for the B.S. and B.A. degree must satisfy all general education requirements for graduation (page 19), earn at least 128 credits, successfully complete the courses required in one of the curricula described in this section, and achieve the required minimum grade-point average in the chosen curriculum. Candidates for the B.A. degree must satisfy a language requirement (page 20). Generally, courses are to be completed in the sequence in which they are arranged.

Minors: See page 21; see also page 24.
Dual-Degree Programs: See page 21.
Student-Designed Majors: See page 103.
Second Majors: See page 21.

Undeclared Major

A limited number of well-qualified freshmen who have expressed an interest in a health-related career, but who are undecided about a specific major may enter the School of Health and Human Services as undeclared students. Undeclared students should explore possible majors by selecting courses from those listed below.

All SHHS undeclared students are advised by a professional academic counselor. Upon declaration of a specific major, each student is assigned to a faculty adviser within the major department.

Student Liability Insurance

All students whose programs require participation in clinical learning internships must purchase and maintain liability insurance for the entire clinical experience. The University has arranged for appropriate insurance coverage at a modest cost to students. Further information may be obtained at major department offices.

Programs of Study

Communication Disorders

(For descriptions of courses, see page 137.)
Communication disorders is the profession devoted to helping people overcome disabilities of speech, language, or hearing. The study of communication disorders may begin in the freshman or sophomore year. Students learn about speech, language, and hearing disorders in the

classroom and then become involved in clinical observation, in the on-campus clinic. Students are encouraged to take elective courses in linguistics, human development, learning theory, early childhood, health administration, special education, or various aspects of rehabilitation.

Students are advised to continue their professional education at colleges or universities offering graduate programs leading to a master's degree and to subsequent certification by the American Speech-Language-Hearing Association. Certified clinicians find employment opportunities in hospitals, schools, community speech and hearing clinics, or private practice.

The required courses in communication disorders, which all students in the program must successfully complete, are COMM 520, Survey of Communication Disorders; COMM 521, Anatomy and Physiology of the Speech and Hearing Mechanism; COMM 522, The Acquisition of Language; COMM 523, Clinic Observation; COMM 524, Clinical Phonetics; COMM 630, Organic Pathologies; COMM 631, Articulation and Language Disorders in Children; COMM 634, Introduction to Clinical Procedures; COMM 704, Basic Audiology; COMM 705, Introduction to Auditory Perception and Aural Rehabilitation; and COMM 777, Speech and Hearing Science. Students must also complete a course in statistics. Other elective courses are available. Students must have a G.P.A. of 2.75 at the end of their sophomore year to continue in the major.

Students interested in this program should consult with the chairperson, Stephen N. Calculator.

Family Studies

(For descriptions of courses, see page 158.)

The department's mission is to support the well-being of individuals and families through research, teaching, and service. Programs emphasize both theoretical and practical knowledge about lifespan development, the social and economic roles of families, child advocacy, teacher and parent education, and intervention programs that support families. The department is committed to acknowledging and supporting diversity, to providing an educational environment that stresses excellence and innovation, and to developing exemplary programs to serve both students and the larger community.

Students learn about families through integration of developmental, theoretical, and empirical information. They prepare for careers in family service organizations, educational institutions and programs, corporations, and government agencies. The Department of Family Studies offers a B.S. degree in child and family studies with three concentrations focusing on particular aspects of family life development. Each concentration has entry-level criteria and unique course requirements. All require close consultation with a faculty adviser.

The child studies concentration is highly structured and has limited enrollment. Acceptance to this program and to the family internship is restricted to students demonstrating exceptional potential for workign with children and families.

Core Courses

Core courses required of each family studies major are: FS 525, Human Development and FS 545, Family Relations.

A minimum of nine family studies courses are required, at least two of which must be at the 700 level.

Twenty credits of supporting coursework are selected in consultation with the adviser. These courses must be 500 level or above and must include at least 12 credits in courses outside the department.

Child Studies

Young Child Students desiring a background in child development for preparation for careers in early childhood settings enroll in 24 credits of concentration courses from the following: FS 623, Developmental Perspectives on Infancy and Early Childhood; FS 635, Teaching/Learning in Social Constructivist Classrooms; FS 708 or FS 709, Child and Family Center Internship or Child Study and Development Center Internship; FS 733, Supervising Programs for Young Children; FS 734, Curriculum for Young Children; and FS 743, Families, Schools, and Community. In addition, a 4-credit FS elective course is selected with the student's adviser's approval.

Young Child/Nursery-Kindergarten Certification

The Nursery-Kindergarten program is a competitive program. This certification has been approved by the New Hampshire State Board of Education to prepare students for certification as nursery-kindergarten teachers. Students interested in nursery-kindergarten certification will be initially accepted into the Young Child program with the understanding that they will be filing an application their junior year for formal acceptance in the Nursery-Kindergarten program and Student Teaching Internship. To be considered for the internship, students must have a minimum overall G.P.A. of 2.8 and a minimum departmental G.P.A. of 3.0. Requirements for the Nursery-Kindergarten program include the Young Child requirements plus the following: FS 708 or 709, Child Study and Development Center Practicums; THDA 621, Education through Dramatization or THDA 583, Puppetry; KIN 675, Motor Development of the Young Child; MATH 621, Number systems for Elementary School Teachers or FS 797, Exploring Math with Young Children (summer only); EDUC 706, Introduction to Reading Instruction in Elementary Schools; EDUC 750, Introduction to Exceptionality or EDUC 751, Education Exceptional Learners or EDUC 760, Introduction to Young Children with Handicaps. An additional elective is selected in consultation with the adviser. Students accepted to the Student Teaching Internship, will enroll in their senior year in FS 785, FS 786, Seminar for Student Teachers and FS 788, Student Teaching of Young Children.

Family Relations

This concentration provides students with educational preparation to work with families in community settings. Students select 28 credits from the following: FS 623, Developmental Perspectives on Infancy and Early Childhood; FS 624, Developmental Perspectives on Adolescence and Early Adulthood; FS 635, Teaching/Learning in Social Constructivist Classrooms; FS 641, Parenting Across the Lifespan; FS 746, Human Sexuality; FS 757, Race, Class, Gender and Families; FS 760, Family Programs and Policies; FS 794, Families and the Law; FS 697, Special Topics; FS 772, Child Advocacy; FS 797, Advanced Special Topics. Recent topics offered under FS 697 and FS 797 include: Financial Issues for the Elderly and Family Assessment.

General Studies

Students desiring to work in settings providing services to children and/or families construct an individual plan of

study in this concentration congruent with their specific professional goals.

Courses required for individual plans of study must be selected from current departmental offerings that are approved by the student's academic adviser.

Family Internship

Internship students will apply knowledge gained from their academic studies in a supervised environment. The internship involves a commitment of fifteen hours per week for two semesters plus a three-hour seminar every other week. Students apply for the internship during the spring semester of their junior year. Students must have completed twenty credits of coursework in family relations or general studies prior to their senior year. Students should have a minimum overall GPA of 3.0 with a departmental GPA of 3.2 or higher. Internship students are required to take FS 760, Family Programs and Policies. Accepted students will enroll in FS 782, Family Internship, and FS 792, Seminar for Family Interns. These courses will count toward the 20 credits required in supporting courses.

Provisional Certified Family Life Educator

The National Council on Family Relations recently approved the Department of Family Studies undergraduate program as meeting the Standards and Criteria required for the *Provisional* Certified Family Life Educator (CFLE) designation. Family studies at UNH is one of only twenty programs nationwide that are so approved.

This means that family studies students can qualify to become Provisional Certified Family Life Educators by completing a certain combination of courses in our regular curriculum. After successfully completing these courses, graduates can apply for provisional certification through NCFR at a reduced fee and using an abbreviated application process. After two years of experience, one is eligible for full status as a Certified Family Life Educator.

Certified Family Life Educators work in a variety of settings including social services, health services, child care, family support, youth programs, parent education, junior and senior high schools, and universities and colleges. The CFLE designation recognizes expertise in the broad range of issues that constitute family life education and increases credibility by validating the individual's education and experience.

Program Requirements

FS 525, Human Development
FS 545, Family Relations
FS 553, Personal and Family Finance or
FS 653, Family Economics
FS 641, Parenting Across the Life Span
FS 746, Human Sexuality
FS 757, Race, Class and Gender
FS 760, Family Programs and Policies
FS 794, Families and the Law
FS 792, Seminar for Family Interns or
FS 785, Seminar for Student Interns

The Certified Family Life Educator designation recognizes a broad range of issues constituting family life education. It acknowledges the preventive focus of family life education and assures the designate has met or exceeded the high standards and criteria needed to provide quality family life education.

Minor

The department offers a minor to interested students in related majors. Students desiring further information are advised to consult with the departmental administrative manager as early as possible.

Health Management and Policy

(For descriptions of courses, see page 164.)

Undergraduates majoring in the health management and policy program are prepared to embark upon management careers in a wide range of health care delivery and financing organizations. Graduates work in many settings, including health care delivery systems, hospitals, nursing homes, health maintenance and other managed care organizations, public health departments, community-based and home-health agencies, mental health facilities, regulatory bodies, consulting companies, and insurance companies.

The academic program is interdisciplinary, with undergraduates taking courses in many academic units of the University. Students gain a broad view of health and health care while developing analytical skills in health care management and policy. The department's computer laboratory is integrated throughout the curriculum.

The department's undergraduate program is an Approved Full Member of the Association of University Programs in Health Administration (AUPHA). Students have the opportunity to become student members in the American College of Healthcare Executives and the American College of Health Care Administrators, both of which are represented by student chapters at the University. There is also an organization for students interested in public health issues. The department curriculum is approved under the New England Regional Student Program.

Academic Program

Competencies are achieved through three components of the curriculum: University general education requirements, HMP collateral courses, and the HMP core courses including a field practicum. Students work closely with their assigned faculty advisers to develop a plan of study to achieve completion of each of these components. Additionally, several upper-level HMP elective courses are available.

University General Education Requirements: Advisers assist students in selecting courses that satisfy certain program expectations and simultaneously meet University general education requirements.

HMP-Required Collateral Courses: A basic understanding is expected in each of the following areas related to health management and policy: (1) microeconomics, (2) finite math or calculus, (3) organizational behavior, and (4) statistics. HMP faculty advisers work with students to select the appropriate courses to fulfill these requirements. In general, students are advised to complete their collateral coursework prior to their junior year in the major. Program-approved courses in organizational behavior and U.S. Health Care Systems (HMP 401) must have been completed successfully before a student may begin junior-level studies in the major.

HMP Core Courses: Each of the following courses must be completed by HMP majors prior to graduation. *Introductory courses* include HMP 400, Introduction to Health Management and Policy; HMP 401, U.S. Health Care Systems; and HMP 501, Epidemiology and Community Medicine. *Upper-division courses* include HMP 721, Managing Health Care Organizations; HMP 723, Health Planning; HMP 739, Health Care Accounting; HMP 740, Health Care Financial Management; HMP 741, Quantitative Methods for Health Care Organizations; HMP 742,

Strategic Management for Health Care Organizations or HMP 748, Health Policy Analysis; HMP 744, Ethical Issues in Health Management and Medicine; and HMP 746, Health Policy. Upper-division courses are not offered every semester and students, in class groupings, generally progress through these courses in a sequential order.

Field Practicum: A full-time practicum (or administrative internship) that integrates class work with a supervised managerial work experience constitutes an essential part of the academic program. It allows students to explore an area of special interest in depth. Courses comprising this component of the major include: HMP 621, Prepracticum Seminar; and HMP 622, Field Practicum. The practicum is divided into three concurrent components: A. Field Practicum Organizational Analysis; B. Field Practicum Management Skills Development; and C. Field Practicum Project Analysis. Field practicum sites are selected by faculty with student involvement and are concentrated in central and northern New England. Given sufficient timing of student request, efforts will be made to arrange practica at distant sites based on special needs.

HMP field practica currently occur during the summer between the junior and senior year in the major. They begin in late May and end in late August and require a full-time commitment (i.e., 40 hours or more per week).

HMP Elective Courses: Upper-division elective courses within the program may include: HMP 750, Comparative Health Care Systems; and HMP 755, Aging and Long-Term Care Policy. In addition, seniors may have the opportunity to elect independent studies (HMP 796) through individual arrangements with HMP faculty. Majors are encouraged to enroll in one or more of these courses before graduation.

Academic Requirements

HMP majors must obtain a minimum of a C– in all HMP core courses and must pass all HMP-required collateral courses. Majors must have an overall grade-point average of 2.50 by the end of the semester preceding their practicum. Students not maintaining an overall grade-point average of 2.50 are reevaluated by the faculty and may be counseled into another major area of study at the University.

The faculty reviews student performances during the semester before the practicum to determine each student's readiness. Students who do not successfully complete prerequisite courses may not be permitted to advance through subsequent courses in the major.

Applications for Major

Students interested in additional information or in applying for admission to the health management and policy major are encouraged to contact the department's director of undergraduate studies. Students seeking internal transfer into the major must complete an internal transfer application form and meet with the director of undergraduate studies. Efforts should be made to complete this process during the freshman year or early in the sophomore year to ensure sufficient time to complete all of the required collateral courses as well as those in the major in a timely and efficient manner.

Honors in Major

The department offers an Honors in Major program. To qualify, students must meet the department's requirement of having an overall 3.20 grade-point average at UNH and a 3.30 grade-point average for required HMP courses taken by the end of the junior year. Honors in Major students take honors courses during the senior year and complete an honors project in health care management or policy. Students work with a faculty member in the department in the development of the honors project. Students should contact the department's Honors in Major adviser for further information.

Academic Minor in Health Management

The department offers an integrated minor in health management designed for students majoring in clinically oriented professional programs offered through other departments in the School of Health and Human Services. Students not enrolled in the school who wish to minor in health management may inquire about doing so by contacting the department's director of undergraduate studies. Students accepted into the minor must complete: (1) three required courses (HMP 401, U.S. Health Care Systems; HMP 721, Managing Health Care Organizations; and HMP 710, Financial Management for Clinicians); (2) one HMP elective course (HMP 501, Epidemiology and Community Medicine; HMP 734, Health Law; HMP 744, Ethical Issues in Health Management and Medicine; or HMP 755, Aging and Long-Term Care Policy); and (3) one additional elective course from a list approved by the department. Students seeking to minor in health management must complete the application available in the department office and meet with the department's director of undergraduate studies *before* commencing the minor.

Kinesiology

(For descriptions of courses, see page 174.)

Kinesiology is a dynamic field of study, keeping pace with society's burgeoning passion for physical activity. The mission of the Department of Kinesiology is to generate, transmit, and apply knowledge about the role of physical activity (including exercise, movement, outdoor adventure experiences, and sport) in the advancement of health in society. The department has several teaching, research, and service functions that support this mission, including the preparation of professionals in the five options described below. While options vary in emphasis, each curriculum offers students fundamental knowledge in the following areas: the biological, psychological, and sociocultural foundations and consequences of physical activity; the pedagogy and rehabilitative aspects of physical activity; and the management and marketing of delivery systems in the field. Each option makes extensive use of field experiences and internships that blend theory with practice.

The department offers five areas of study for majors: (1) athletic training; (2) exercise science; (3) outdoor education; (4) sport studies; and (5) physical education pedagogy. Students who wish to minor in kinesiology must complete 20 credits of coursework that have been approved by a department minor adviser. No more than 6 of the 20 credits may be earned through activity or coaching courses.

Students interested in majoring or minoring in kinesiology should consult with the specific option coordinator.

Athletic Training Option

An athletic trainer implements injury prevention programs and immediate treatment and rehabilitation procedures for injured individuals as directed by physicians. The Commission on Accredi-

tation of Allied Health Education Programs (CAAHEP) -accredited athletic training option prepares professionals qualified to attend the athlete, the fitness-conscious jogger, or the skilled professional athlete.

Students take coursework in prevention, evaluation, management, care, and rehabilitation of athletic injuries as well as administration, education, and counseling. Students must earn a grade of C (2.00) or better in all other KIN required courses and ZOOL 507-508.

Students may repeat a required course only once. Failure to achieve a grade of C (2.00) or better on this repeat will result in separation from the Athletic Training Option. Students who accumulate a total of three grades of below C (2.00) in required courses will be separated from the Athletic Training Option.

Students are also required to work in University athletic training rooms and off-campus clinical sites as they earn clinical experience. Successful completion of the entire program, including 1,000 hours of supervised clinical experience, qualifies students to take the NATA-BOC Certification Exam. Students who wish to pursue both NATA-BOC certification and public school teacher certification should also see the pedagogy option. This double course of study will require between five and six years.

Students are admitted to the University in the athletic training option with conditional status. Specific criteria must be met during the student's first year before he or she attains full-time status in the option. It's very important that any interested students consult with option coordinator, Daniel Sedory, as soon as possible.

Required Courses	Credits
KIN 506, Concepts of Athletic Training	4
KIN 507, Concepts of Athletic Training Lab	1
KIN 527, Scientific Foundations of Health and Fitness	4
KIN 585, Emergency First Responder	4
KIN 620, Physiology of Exercise	4
KIN 652, Clinical Kinesiology	3
KIN 653A, Musculoskeletal Assessment	2
KIN 658, Athletic Training for the Professional I	4
KIN 658 L01, Athletic Training for the Professional I Lab	1
KIN 659, Athletic Training for the Professional II	4
KIN 659 L01, Athletic Training for the Professional II Lab	1
KIN 660, Therapeutic Exercise in Athletic Training	4
KIN 661, Therapeutic Exercise Lab	1
KIN 662, Therapeutic Modalities in Athletic Training	4
KIN 663 Therapeutic Modalities Lab	1
KIN 665, Laboratory Practicum in Athletic Training	
665A, Level I	2
665B, Level II	2
665C, Level III	2
665D, Level IV	2
665E, Level V	2
KIN 710, Organization and Administration of Athletic Training Programs	4
KIN 715, Seminar in Athletic Training	4
KIN 718, Career Preparation in Athletic Training	4
KIN 780, Psychological Factors in Sport	4
University Required Courses	
NUTR 475, Nutrition in Health and Disease	4
PSYC 401, Introduction to Psychology	4
Statistics Course	4
ZOOL 507-508, Human Anatomy and Physiology	8
HP 540, Life Style and Human Behavior	4

Exercise Science Option

This curriculum prepares individuals for career opportunities in health promotion programs in hospitals, industry, and communities. Exercise scientists work in physical activity programs of prevention, intervention, and rehabilitation. Students must earn a grade of C (2.00) or better in every required course. Students may repeat a required course only once. Failure to achieve a grade of C (2.00) or better on this repeat will result in separation from the Exercise Science Option. Students who accumulate a total of three grades of below C (2.00) in required courses will be separated from the Exercise Science Option. All required courses must be completed before enrolling in KIN 650. Interested students may consult with the option coordinator, Robert Kertzer.

Required Courses	Credits
KIN 585, Emergency First Responder	4
KIN 620, Physiology of Exercise	4
KIN 621, Exercise Laboratory Techniques	3
KIN 650, Exercise Science Internship	8
KIN 652, Clinical Kinesiology	3
KIN 653A, Musculoskeletal Assessment	2
KIN 704, Clinical Sress Testing & Electrocardiography	4
KIN 705, Topics in Applied Physiology	4
KIN 724, Metabolic Adaptations to Exercise	4
KIN 736, Exercise Texting & Prescription	4
KIN 737, Personal Training & Exercise Leadership	4
KIN 794, Practicum in Cardiac Rehabilitation	2
KIN 724, Metabolic Adaptations to Exercise	4
University Required Courses	
One course chosen from SOC 502, PSYC 402, or HHS 540	4
CHEM 403-404, General Chemistry	8
CS 401, Computer Applications	4
NUTR 475, Nutrition in Health and Disease	4
PSYC 401, Introduction to Psychology	4
ZOOL 507-508, Human Anatomy and Physiology	8

Outdoor Education Option

The outdoor education option prepares individuals for careers working with diverse populations in public and private schools, organizations, and agencies. The techniques and approaches of adventure education represent the underlying philosophy of the curriculum. The option is interdisciplinary in scope, uses the various natural resources in the seacoast and mountain area, and gives students ample opportunity for practical application and field experience. Students must earn a grade of C (2.00) or better in every required course. In addition they must complete 100 days of documented leadership experience prior to beginning internship. Students seeking teacher certification should enroll in the pedagogy option and select additional appropriate courses in outdoor education. Interested students may consult with the option coordinator, Michael Gass.

Required Courses	Credits
KIN 540, Top Rope Rockclimbing	2
KIN 541, Challenge Course Management	4
KIN 543, Winter Backpacking	2
KIN 550, Outdoor Education Philosophy and Methods	4
KIN 551, Adventure Programming: Backcountry Based Experiences	3
KIN 552, Adventure Programming: Water Based Experiences	3
KIN 681, Theory of Adventure Education	4
KIN 682, Outdoor Leadership	4
KIN 684, Emergency Medical Care: Principles and Practices	3
KIN 685, Emergency Medical Care: Principles and Practices Lab	2
KIN 686, Wilderness Emergency Medical Care	4
KIN 687, Leadership Practicum	4
KIN 786, Organization and Administration of Outdoor Education	4
*KIN 650, Internship (2-4) Cr/F	
*Note: Proof of 100 days of leadership experience is required prior to taking this course.	
Elective Courses (Choose one)	
KIN 545, Wilderness Survival and Rescue	2

KIN 546, Whitewater Canoeing	3
KIN 547, Lead Rockclimbing	3
KIN 548, High Altitude Mountaineering	4
KIN 549, Wilderness Programming Skills	4-8
KIN 782, Therapeutic Applications of Adventure Programming	4
KIN 693C, Teaching Assistantship	2 Cr/F

University Required Courses

ENGL 501, Introduction to Prose Writing	4
Other: Core of courses emphasizing the particular area or population in outdoor education of interest to student —e.g., business, education, psychology—selected with assistance of an adviser	20

Sport Studies Option

Sport studies is an interdisciplinary field of study that provides a foundation for a variety of career paths, including sports writing or broadcasting; management or marketing in sport organizations; or further graduate study in areas such as sport law or sport psychology. Students take a core of foundation courses (e.g., sport in literature, the sport industry), as well as electives in applied areas such as sport marketing, broadcasting and sport psychology. Cognate courses may be in journalism, communication, administration, psychology, or in other approved areas. Students must earn a grade of C (2.00) or better in each required University and KIN course. An internship experience or an independent study is required. An internship is strongly recommended since it is often critical to career development. Interested students may consult with the option coordinator, Stephen Hardy.

Required Courses	Credits
I. Take one of the following:	
KIN 561, History of American Sport and Physical Culture	4
KIN 635, Sport in Literature	4
KIN 741, Sport in Society	4
II. Take each of the following:	
KIN 562, Introduction to Sports Information	4
KIN 580, The Sport Industry	4
KIN 750, Theories of Motivation in Sport	4
KIN 761, Senior Seminar in Sport Studies	4

Electives

Sixteen credits of approved sport studies electives to include KIN 650 or KIN 696.

University Required Courses

CS 401, Computer Applications	4
PSYC 401, Introduction to Psychology	4
SOC 400, Introductory Sociology	4
One approved statistics course	4

Cognate Requirement (outside of Department of Kinesiology)

Students must select a second major, a minor, or a package of cognate courses approved by the faculty (minimum 20 credits). Suggested areas are administration, communication, economics, English, history, psychology, and sociology.

Physical Education Pedagogy Option

Pedagogy is the art and science of teaching. This option integrates a general education background with the theoretical and process knowledge involved in teaching movement- and physical activity-based elementary, middle, and secondary physical education programs. Extensive practicum experiences prepare students to teach preschool children, school-aged youth, and young adults, including students with developmental disabilities.

The physical education pedagogy option provides the foundation for public school teacher certification through the Department of Education's fifth-year program. All fifth-year candidates must meet the requirements for admission to graduate school (e.g., grade-point average of 2.67 or above and 900 or above on the Graduate Record Examination) (see page 34). Students not seeking certification will find a bachelor's degree a solid basis for successful teaching or coaching in settings such as athletic or fitness clubs, YWCAs and YMCAs, boys' and girls' clubs, private schools, or resorts.

Internal transfer candidates must have a minimum GPA of 2.25. All physical education pedagogy option students must receive a "B" grade (3.0) or better in KIN 563, Secondary PE Pedagogy; KIN 606, Secondary PE Practicum; KIN 692, Elementary PE Pedagogy; KIN 781, Special PE Pedagogy; and KIN 783, Elementary PE Practicum. Students who accumulate a total of three grades below C (2.00) in required departmental courses will be separated from the pedagogy major. A student may complete a required class only once.

Interested students should consult with the option coordinator, Ben Dyson.

Required Courses	Credits
KIN 500, Historical and Contemporary Issues in Physical Education	4
KIN 501, First Aid Responding to Emergencies	2
KIN 504, Skill Analysis and Assessment	4
KIN 527, Scientific Foundations of Health and Fitness	4
KIN 563, Secondary Physical Education Pedagogy	4
KIN 600, Movement Fundamentals	4
KIN 601, Lifetime Sports	3
KIN 602, Adventure Activities	3
KIN 603, Team Sports	3
KIN 604A, Rhythmic Forms I	1.5
KIN 604B, Rhythmic Forms II	1.5
KIN 606, Secondary Physical Education Practicum	4
KIN 608, Track and Field	1.5
KIN 609, Gymnastics	1.5
KIN 620, Physiology of Exercise	4
KIN 652, Clinical Kinesiology	3
KIN 653B, Biomechanical Analysis of Movement	2
KIN 675, Motor Development	4
KIN 692, Elementary Physical Education Pedagogy	4
KIN 780, Psychological Factors in Sport	4
KIN 781, Special Physical Education Pedagogy	4
KIN 783, Elementary Physical Education Practicum	4

University Required Courses

EDUC 500, Exploring Teaching	4
PSYC 401, Introduction to Psychology	4
ZOOL 507-508, Human Anatomy and Physiology	8

Medical Laboratory Science

(For descriptions of courses, see page 185.)

The Department of Medical Laboratory Science (MLS) is accredited by the National Accrediting Agency for Clinical Laboratory Sciences. The department offers the MLS program for students who are interested in pursuing a challenging and rewarding career in analytical biomedicine. The curriculum for MLS majors provides students with a sound background knowledge in the biological and physical sciences and a quality education in specialized science theory and laboratory skills. In addition, the curriculum offers students an opportunity to become more knowledgeable in the arts, humanities, and social sciences. Students entering the MLS program can pursue a degree in one of two tracks: (1) a B.S. in MLS-Clinical Track; (2) a B.S. in MLS-Research Track. They will initially enroll in the MLS program without designating a specific MLS track. Students will be informed of the specifics of the MLS-Clinical Track and MLS-Research Track in their freshman year course, "Introduction to Medical Laboratory Science, MLS 401." Also, students may obtain detailed information concerning the two MLS tracks from their academic advisers. A decision to pursue a specific MLS track must be made by the end of their junior year.

MLS-Clinical Track

Students selecting the MLS-Clinical Track spend their freshman, sophomore, and junior years and the fall semester of their senior year on the University campus. During the spring semester of the senior year, these students take clinical internship at one of the clinical affiliates. Clinical internship positions are limited. Selection to fill available positions will be based on established criteria. Students will be evaluated based on academic performance, interview(s) by clinical faculty, and references.

The students enrolled in this track may follow the generalist (medical technologist) curriculum to become certified as a medical technologist or choose to specialize in either Clinical Microbiology, Clinical Hematology, Clinical Immunohematology, or Clinical Chemistry. Students choosing the medical technology option will spend 26 weeks at a clinical affiliate where they complete clinical courses in Advanced Clinical Microbiology (MLS 751), Advanced Clinical Hematology (MLS 752), Advanced Clinical Immunohematology (MLS 753), and Advanced Clinical Chemistry (MLS 754). Upon successful completion of this program, students are awarded a B.S. degree and are eligible to take the American Society of Clinical Pathologists (ASCP) and National Certification Agency (NCA) certification examinations. Students choosing the categorical option will spend 24 weeks at a clinical internship site where they complete either Clinical Microbiology Internship (MLS 761), Clinical Hematology Internship (MLS 762), Clinical Immunohematology Internship (MLS 763), or Clinical Chemistry Internship (MLS 764). Upon successful completion, students are awarded a B.S. degree and are eligible to take the ASCP and NCA categorical examinations in their speciality area.

The graduates of the MLS-Clinical Track perform various medical laboratory tests and provide the diagnostic assistance required in modern patient care. These professionals are vital members of the health care team. Also, they perform various analytical procedures in a wide variety of biomedical laboratories. These graduates are employed in hospitals, biotechnology, research, industry, education, and a variety of other health care settings.

All students participating in clinical courses must purchase liability insurance and show evidence of selected immunizations. Internship fees will be charged by the clinical affiliate in some instances.

MLS-Research Track

The curriculum for this track focuses on providing students with a quality education in the fundamentals of biomedical laboratory science and laboratory skills in addition to a broad-based university general education. This track is appropriate for students desiring employment in a wide variety of biomedical research laboratories in universities, medical schools, diagnostic product companies, biotechnology companies, hospitals, government agencies, etc. Students seeking a degree in this track are qualified to pursue advanced education in the biomedical areas. Students intending to pursue advanced degrees should consult with their academic advisers as early as possible so that appropriate academic plans can be established. Graduates of this track are qualified to seek post-graduation clinical internship if they wish to attain certification as a medical technologist or a specialist.

Students pursuing a degree in the MLS-Research Track follow the same curriculum as the curriculum required for the MLS-Clinical Track with the exception of taking a minimum of 16 additional credit hours from the following courses.

ANSC 623, Comparative Histology	4
PBIO 754, Laboratory in Biochemistry and Molecular Biology of Nucleic Acid	5
MICR 702, Infectious Disease & Health	5
MICR 706, Virology	5
MICR 752, Cell Culture	5
GEN 604, Principles of Genetics	4
GEN 753, Cytogenetics	4
MLS & other courses (consult with academic advisers)	

MLS-Clinical Track: Academic Requirement

Students pursuing a degree in the MLS-Clinical Track must obtain a grade of C or better in all MLS courses. The students must have achieved a minimum 2.5 cumulative grade-point average (GPA) at the end of their junior year. A personal interview at the clinical affiliate is required. This interview evaluates a student's understanding of the profession, communication skills, maturity, self-confidence, and supervisory potential. Students must demonstrate these attributes to participate in the clinical courses.

MLS-Research Track: Academic Requirement

The students in the MLS-Research Track must meet the UNH requirements for the bachelor of science degree.

Career Mobility Program

This option is designed to make the B.S. degree in MLS available to certified laboratory assistants, medical laboratory technicians, military-trained laboratory personnel, and other individuals with at least two years of full-time recent experience in the clinical laboratory. This may be done on a full- or part-time basis by taking required courses at UNH or other accredited institutions. Students have the opportunity to challenge MLS clinical course requirements through credit by examination. Written and practical examinations are available in the areas of Clinical Microbiology, Clinical Hematology, Clinical Immunohematology, Clinical Chemistry, and Urinalysis/Body Fluids. Students interested in the option should contact the chairperson of the MLS department.

MLS Minor

Students may obtain a minor in MLS by successfully completing MLS 500 and four additional MLS courses at the 600 or 700 level totaling a minimum of 20 credits. Comparative Histology (ANSC 623) or/and Investigations in the Animal Sciences (ANSC 796) can be substituted for one or two of these courses.

Students interested in the MLS program should consult the chairperson of the MLS department.

Freshman Year	**Fall**	**Spring**
MLS 401, Introduction to Medical Laboratory Science	1	—
ZOOL 507-508, Human Anatomy and Physiology	4	4
CHEM 403-404, General Chemistry	4	4
ENGL 401, Freshman English	4	—
Electives (3)	4	8
	17	16
Sophomore Year		
CHEM 545-546, Organic Chemistry	5	—
MICR 503, General Microbiology	5	—
MICR 700, Pathogenic Microbiology	—	5
MLS 500, Introduction to Medical Laboratory Methods and Techniques	—	5

MLS 650A, Phlebotomy Theory	—	2
MATH 424B, Calculus for Life Science *or*		
HHS 540, Statistics for Health and Human Services Professionals	—	4
BCHM 658, General Biochemistry	—	3
BCHM 659, General Biochemistry Lab	—	2
DCE 491, Introduction to Computer Information Studies I	2	—
Elective (1)	4	—
	16	21
Junior Year		
MLS 652, Clinical Hematology	6	—
MLS 654, Clinical Chemistry	—	5
MLS 610, Laboratory Management	4	—
MLS 650B, Phlebotomy Clinical Internship	2	—
MICR 705, Immunology	5	—
MLS 720, Clinical Mycology/ Parasitology	—	5
Electives (3)	4	8
	21	18
Senior Year		
MLS 655, Urinalysis and Body Fluids		3
MLS 653, Clinical Immunohematology		4
MLS 700, Toxicology		4
MLS 602, Medical Laboratory Seminars		2-4
Elective (1)		4
		17-19

*Senior Year-Spring for MLS-Clinical Track: generalist, MLS 751–754 (20 credits); categorical, MLS 761, 762, 763, or 764 (20 credits). Senior Year-Spring for MLS-Research Track: required courses needed to complete the MLS-Research Track option.

Nursing

(For descriptions of courses, see page 192.)

The nursing program reflects the mission and goals of the University and focuses on the uniqueness of each individual. The program is accredited by the National League for Nursing. Its goals are to help nursing students develop knowledge and skills essential to the present and future practice of nursing. Graduates of the program are prepared to provide care to individuals and groups, help people identify and meet their health care needs, be effective colleagues on the health care team, and shape the future of health care.

The curriculum is divided into two areas: biological and social sciences as a foundation for courses in the major; and nursing courses, which emphasize caring, critical thinking, problem solving, decision making, and developing clinical skills. Clinical experiences are offered in area hospitals and in community health agencies. The senior year culminates in a practicum in which students apply curriculum concepts to an interest area of their choice.

The faculty of the nursing program believe learning is a creative process wherein students are active participants in their education, growth, and development as professional nurses. Faculty members are facilitators and mentors to students within a supportive, scholarly environment.

Honors in major courses are offered to interested nursing students who have achieved a minimum cumulative grade-point average of 3.20.

The following prerequisite courses must be completed successfully prior to the first clinical course, NURS 514, Techniques of Clinical Nursing: ENGL 401, ZOOL 507-508, NUTR 475, PSYC 401, MICR 501, and NURS 501. FS 525 may be a pre- or corequisite to NURS 514. A course in statistics must be completed prior to, or taken concurrent with, NURS 645, Nursing Research. Prerequisite courses require grades of C or better and only one prerequisite course may be repeated one time in order to achieve successful completion.

Most of the prerequisite courses also meet general education requirements. A cumulative grade-point average of 2.50 must be attained prior to NURS 514 and maintained throughout the program. Major courses require a minimum grade of C.

Students are responsible for their own transportation to clinical agencies, uniforms, professional equipment, liability and health insurance coverage, and selected immunizations. Additional costs associated with the program include laboratory fees each semester beginning in sophomore year and fees associated with attendance at professional meetings. Students must be certified in cardiopulmonary resuscitation before the first clinical course and recertified as necessary until graduation.

Freshman Year	Fall	Spring
ZOOL 507-508, Human Anatomy and Physiology	4	4
NUTR 475, Nutrition in Health and Disease	4	—
ENGL 401, Freshman English	4	—
PSYC 401, Introduction to Psychology	—	4
Electives (3)	4	8
	16	16
Sophomore Year		
MICR 501, Public Health Microbiology	4	—
NURS 501, Introduction to Nursing	4	—
*One course in statistics	4	—
FS 525, Human Development	—	4
NURS 502, Pathophysiology/ Pharmacology	—	4
NURS 508, Foundations of Nursing Judgment	—	4
NURS 514, Techniques of Clinical Nursing	—	4
Elective	4	—
	16	16
Junior Year		
NURS 615, Caring for Adults	6	—
NURS 619, Clinical Decision Making I	4	—
NURS 620, Caring for the Childbearing and Childrearing Family, *or* NURS 618, Caring for People with Alterations in Mental Health, *and* NURS 624, Nursing in the Community	—	6
	—	4
	—	4
NURS 622, Clinical Decision Making II	—	4
NURS 645, Nursing Research	2	—
Electives (2 or 3)	4	4-8
	16	or 16-20
Senior Year		
NURS 703, Nursing Leadership/ Management and the Organizational Context	4	—
NURS 618, Caring for People with Alterations in Mental Health, *and* NURS 624, Nursing in the Community	4	—
	4	—
or NURS 620, Caring for the Childbearing and Childrearing Family,	4	—
NURS 720, Professional Nursing Practice: Transitions	—	8
Electives (3)	4	8
	14-16	16

*HHS 540, PSYCH 402, SOC 502, etc.

R.N. Baccalaureate Program

Registered nurses with a valid New Hampshire license who meet University admission criteria may pursue, on a full- or part-time basis, a bachelor of science degree with a major in nursing at UNH in Durham, Keene State College, or at UNH Manchester.

All students must successfully complete prerequisite courses before entering the nursing component. Curriculum requirements may be met through transfer credits, course enrollments, and challenge examinations. An R.N. license and one year of practice experience are required for all nursing coursework.

The nursing component is based on the belief that R.N. students enter the program with knowledge and competence gained through previous educational and work experiences. This knowledge and competence can be demonstrated through completion of required baccalaureate-level nursing courses. Individualized plans of study are developed to enable completion of nursing content.

The R.N. student must earn a minimum of 128 credits and have a 2.5 cumulative grade point average in order to enroll in clinical nursing courses and maintain that GPA throughout their coursework. A minimum grade of C is required in each nursing course.

Interested R.N.s should consult with the R.N. program coordinator at Durham, Keene, or Manchester.

Occupational Therapy

(For descriptions of courses, see page 194.)

Occupational therapy practice is directed toward enabling or restoring individual capacity for functional independence and adaptation in the context of clients' environments. The occupational therapy program includes studies in three major areas: (1) liberal arts; (2) biological, behavioral, and health sciences; and (3) occupational therapy theory and practice. Observation and guided practice in local clinical sites are an integral part of some courses. The program is accredited by the Accreditation Council for Occupational Therapy Education (ACOTE). ACOTE is located at the American Occupational Therapy Association, 4720 Montgomery Lane, P.O. Box 31220, Bethesda, MD 20824-1220. ACOTE's phone number is (301) 652-2682.

Following completion of the four-year academic program, students are placed in three 3-month, full-time fieldwork experiences: OT 797, Psychosocial Dysfunction; OT 798, Physical Dysfunction; OT 799, Special Area. These level II fieldwork experiences are scheduled in centers that have established educational programs and are approved by the department. Successful completion of these three placements qualifies students to be awarded a B.S. degree or post-baccalaureate certificate. A fee is charged for the coordination of level II fieldwork. Graduates of the program are eligible to sit for the Certification Examination for the Occupational Therapist administered by the National Board for Certification in Occupational Therapy, Inc. (NBCOT). After successful completion of this exam, the individual will be an occupational therapist, registered (OTR). Most states require licensure in order to practice; however, state licenses are usually based on the results of the NBCOT Certification Examination.

Students must maintain a minimum 2.5 cumulative grade-point average in required courses and earn a grade of C or better in designated courses. Specific requirements are delineated in the *OT Department Policy and Procedure Manual*, which is distributed to all new students. Curriculum review and revision is undertaken annually. Students are expected to check with their department advisers in September for updated policies and requirements. Students are responsible for transportation to off-campus clinical and other learning experiences and must purchase personal liability insurance for coverage for the clinical components of the curriculum. Students are responsible for meeting the health clearances established by their level I and level II fieldwork sites. Proof of immunizations such as poliomyelitis, rubella, and hepatitis B may also be required. For level II fieldwork, health insurance and a physical examination, including a tuberculin test, is required.

Undergraduate students may enter the program at the freshman level or through transfer at the junior level. Prospective students with baccalaureate degrees may apply to the Post-Baccalaureate Certificate Program. Transfer and Certificate Program applications are accepted for fall semester only. The deadline for application is March 1. Transfer students must enter the program with the following: (1) 64 credits and most general education requirements; (2) completion of the following courses: ENGL 401; PSYC 401; a child development or human development course; ZOOL 507-508, or another two-semester human anatomy and physiology course which must include lecture and lab.

In addition to the courses listed above, certificate program students must have a baccalaureate degree from an accredited college or university. Freshman and transfer students applying to the University may obtain applications from the Admissions Office. UNH students applying for admission may obtain applications from the Department of Occupational Therapy. Post-Baccalaureate Certificate Program applications may also be obtained from the Department of Occupational Therapy. For more information about the program contact the department.

The course sequence for students entering the program as freshmen follows.

First Year	Fall	Spring
ENGL 401, Freshman English	4	—
PSYC 401, Introduction to Psychology	4	—
OT 500, The Behavior and Development of Children	—	4
ZOOL 507-508, Human Anatomy and Physiology	4	4
OT 410, Introduction to Occupational Therapy	—	4
OT 441, Level I Fieldwork—Introduction	—	1
Electives	4	4
	16	17
Sophomore Year		
KIN 652, Clinical Kinesiology	—	3
KIN 653A, Musculoskeletal Assessment	—	2
OT 511, Introduction to Professional Literature and Communication	4	—
OT 514, The Meaning of Human Occupation	—	4
OT 501, Developmental Tasks of Adulthood	4	—
OT 581, Concepts of Medicine and Health for Occupational Therapists	4	—
Electives	4	6
	16	15
Junior Year		
KIN 706, Neurology	4	—
OT 641, Level I Fieldwork Observation and Interpretation	—	1
OT 682, Rehabilitation Principles for Occupational Therapists	—	4
OT 683, Occupational Therapy: Psychiatric Foundations	4	—
OT 694, Neurodevelopment: Assessment and Intervention	—	4
One statistics course (SOC 502, HHS 540, PSYC 402, RECO 701, BIOL 528, or EDUC 785)	4	—
Electives	4	7
	16	16

Senior Year		
OT 725, Occupational Therapy in Mental Health Service Delivery Systems	4	—
OT 733, Treatment in Adult Neurodysfunction	4	—
OT 734, Systems of Therapeutic Intervention	—	4
OT 723, Group Process in Occupational Therapy	2	—
OT 786, Management of Occupational Therapy Services	—	2
OT 788, Transitions: Student to Professional	—	2
Electives	6	8
	16	16

Level II Fieldwork Experiences
OT 797, Psychosocial Dysfunction Fieldwork
OT 798, Physical Dysfunction Fieldwork
OT 799, Special Area Fieldwork

Course Sequence for Transfer Students
First Year (Junior Year)
Fall
KIN 706, Neurology
OT 410, Introduction to Occupational Therapy
OT 441, Level I Fieldwork—Introduction (1 cr.)
OT 511, Introduction to Professional Literature and Communication
OT 581, Concepts of Medicine and Health for Occupational Therapists

Spring
KIN 652, Clinical Kinesiology (3 cr.)
KIN 653A, Musculoskeletal Assessment (2 cr.)
OT 514, The Meaning of Human Occupation
OT 641, Level I Fieldwork—Observation and Interpretation (1 cr.)
OT 694, Neurodevelopmental Assessment and Evaluation
Elective (if needed)

Summer
OT 682, Rehabilitation Principles for Occupational Therapists (4 cr.)

Second Year (Senior Year)
Fall
OT 501, Developmental Tasks of Adulthood (if needed)
OT 683, Occupational Therapy: Psychiatric Foundations
OT 733, Treatment in Adult Neurodysfunction
One statistics course (if needed)—SOC 502, HHS 540, PSYC 402, RECO 701, BIOL 528, or EOUC 785.
Spring
OT 723, Group Process in Occupational Therapy (2 cr.)
OT 725, Occupational Therapy in Mental Health Service Delivery Systems
OT 734, Systems of Therapeutic Intervention
OT 786, Management of Occupational Therapy Services (2 cr.)
OT 788, Transitions: Student to Professional (2 cr.)

Third Year (Fieldwork carries no academic credit)
OT 797, Psychosocial Dysfunction Fieldwork
OT 798, Physical Dysfunction Fieldwork
OT 799, Special Area Fieldwork

Recreation Management and Policy

(For descriptions of courses, see page 206.)
The Department of Recreation Management and Policy is nationally accredited by the National Recreation and Parks Association/American Association for Leisure and Recreation. The department's curriculum supports a broad-based liberal education and an opportunity to acquire specialized professional knowledge and skills. As the fabric of life in contemporary society grows in complexity, people are increasingly turning to leisure and the recreation services profession to find meaning, renewal, and enrichment in life. Recreation professionals work to enhance quality of life in diverse settings, including human services, health care, natural recreation resource areas, and commercial recreation businesses. Graduates are generally employed in management postitions in communities, youth-serving agencies, conference centers, resorts, parks, hospitals, rehabilitation centers, and long-term care facilities. Population and economic projections suggest that recreation service industries will continue to expand and thereby continue to provide numerous professional career opportunities.

Curriculum Structure
Students entering the major may choose either: (1) the program administration option, which includes the professional core and RMP electives combined with courses to support career interests, or (2) a specialized option in therapeutic recreation, which includes the professional core and required courses in therapeutic recreation.

International Study in Recreation and Leisure
A semester abroad sponsored by the American Universities International Program is available to students pursuing a degree in recreation management and policy. Programs in Scotland, Australia, New Zealand, South Africa or Belize provide discipline-related exchange opportunities. Approval by the curriculum director is required approximately one year before departure. Eleven transfer credits can be granted. Other destinations can be negotiated through the Center for International Education on campus.

Core Courses
All majors must complete a core curriculum of eight courses: RMP 490, History and Philosophy of Leisure; RMP 501, Recreation Services for Individuals with Disabilities; RMP 557, Recreation Services Program Design and Planning; RMP 558, Program Supervision and Leadership; RMP 654, Professional Development and Ethics; RMP 664 (A or B), Professional Internship; RMP 724, Grantsmanship, Evaluation, and Research; and RMP 772, Law and Public Policy in Leisure Services.

A supervised internship (RMP 664) and an emphasis area or minor of 18 to 20 credits are required of all majors. The internship is designed to create a bridge between theory and practical application. Students working with their advisers and the internship coordinator select an appropriate setting based on their professional and career interests. They must complete a minimum of 480 hours of supervised field study within twelve weeks. Specific requirements are identified in the Internship Manual available from the Department of Recreation Management and Policy. The emphasis area or minor supports a student's career goals and is designed by the student with approval from their academic adviser.

Program Administration Option
This option prepares students for managerial positions in organizations that provide recreation and leisure services. Curriculum design emphasizes the effective and efficient planning, delivery, and evaluation of leisure based programs and services. Depending upon the RMP electives and the career support emphasis or minor chosen, students may expect to find employment in a broad range of settings. Recent graduates have found employment in the areas of conference and meeting planning, municipal park and recreation services, commercial/entrepreneurial recreation businesses, youth serving agencies, resorts and resource management positions in state and federal agencies.

In addition to the required core courses, students who pursue the program administration option must complete the following departmental requirements: RMP 663, Management and Policy in Leisure Services; two RMP course electives; CS 401, Computer Applications, or an approved equivalent; SOC 502, or other descriptive Statistics; PSYC 401, Introduction to Psychology; FS 525, Human Development; MKTG 550, Survey of Marketing; MGT 580,

Organizational Behavior; and KIN 501, Advanced First Aid and Emergency Care, or equivalent certification.

Therapeutic Recreation Option
This option prepares students to work primarily in clinical, allied health facilities such as hospitals, rehabilitation centers, mental health centers, and extended care facilities focusing on therapeutic recreation services while achieving overall treatment goals. Observation and applied experience is a component of several courses. Students complete a 12- to 15-week full-time clinical internship under the supervision of a Certified Therapeutic Recreation Specialist (CTRS). Students must purchase personal liability insurance for coverage for the clinical components of the curriculum. The Bureau of Labor Statistics reports that therapeutic recreation is one of the fourteen fastest growing occupations in the country. The occupational outlook statistics reflect a "39% increase in demand for recreational therapists with strong clinical backgrounds" for the beginning of the twenty-first century. Upon successful completion of this option, students are prepared to meet sitting requirements for the National Council for Therapeutic Recreation Certification Examination.

In addition to the required core courses, students who choose this option must complete the following departmental requirements: RMP 502, Introduction to Therapeutic Recreation; RMP 603, Principles of Therapeutic Recreation; RMP 604, Clinical Aspects and Techniques in Therapeutic Recreation; RMP 606, Therapeutic Recreation Practices and Procedures; RMP 705, Management in Therapeutic Recreation; CS 401, Computer Applications, or approved equivalent; PSYC 401, Introduction to Psychology; PSYC 402, Statistics in Psychology; PSYC 561, Abnormal Behavior; FS 525, Human Development; ZOOL 507-508, Human Anatomy and Physiology; KIN 652, Clinical Kinesiology, and KIN 653A, Musculoskeletal Assessment.

Criteria for Admission and Retention
Internal transfer students interested in applying to the major must meet with an RMP faculty member prior to receiving an application for admission to the major. Transfer applications are accepted October 1, for spring semester and March 14 for fall semester. Applications can be obtained from the Department of Recreation Management and Policy. Students within the major are required to maintain a minimum 2.50 semester grade-point average every semester to retain good academic standing within the major. In addition, student majors must obtain a grade of C (2.00) or better in RMP courses and a grade of C– (1.67) or better in all other courses specifically required by the department.

Social Work

(For descriptions of courses, see page 209.)
The Department of Social Work's undergraduate program offers both a major and a minor in social work. It is a specialized degree that prepares graduates for generalist social work practice with a solid foundation in the knowledge, skills, and values base of social work and the liberal arts. Social work graduates apply their education in working with individuals, groups, and social systems. In addition, it prepares qualified students to pursue graduate education in schools of social work and other graduate programs in human services.

The baccalaureate program at the University of New Hampshire is accredited by the Council on Social Work Education (CSWE) and must meet rigorous academic standards to retain this accreditation. Social work majors pursue a program that encompasses the professional social work foundation of social welfare policy, social work practice, human behavior in the social environment, research and field education. Course content on values and ethics, populations-at-risk, human diversity, and social and economic justice is integrated throughout the curriculum.

To enable students to gain direct experience and to integrate classroom content with the demands of professional social work practice, students are required to complete a 450-hour social work internship over two semesters during the senior year. The senior field placement is a "capstone" experience in the final year of the baccalaureate program and is arranged between the student and the field education coordinator. Students are required to pay a liability insurance fee for their off-campus field education experience.

Social work majors earn the B.A. degree with a notation on their University records, "majored in social work." This is equivalent to a B.S.W. degree. Graduates are eligible for practice in a variety of social work settings throughout the United States and full membership in the National Association of Social Workers. In addition, qualified graduates may be eligible for advanced standing in M.S.W. programs which offer advanced standing.

Academic Program
Social work majors are required to take ZOOL 401; SW 524, 525, 550, 551, 601, 622, 623, 640, 640A, 641, 641A. In addition, students are expected to successfully complete five courses taken from the disciplines of anthropology/sociology, political science, macroeconomics, philosophy, and psychology. Many of these may also fulfill general education requirements. Students wishing to minor in social work are required to take any five courses offered by the department, excluding SW 640, 641. Students interested in either a major or minor in social work should consult with the undergraduate program coordinator, Martha Byam, Rm. 23, Murkland Hall, 862-1799.

College of Life Sciences and Agriculture

William W. Mautz, Dean
Patricia D. Bedker, Associate Dean
Emery P. Booska, Assistant Dean

Department of Animal and Nutritional Sciences
Department of Biochemistry and Molecular Biology
Department of Microbiology
Department of Natural Resources
Department of Plant Biology
Department of Resource Economics and Development
Department of Zoology

Bachelor of Arts
Plant Biology
Zoology

Bachelor of Science
Adult and Occupational Education
Animal Sciences
- Bioscience and Technology
- Equine Sciences
- Preveterinary Medicine

Biochemistry
Biology
- Ecology and Evolutionary Biology
- General Biology
- Marine and Freshwater Biology
- Molecular, Cellular, and Developmental Biology

Community Development
Dairy Management
Environmental and Resource Economics
Environmental Conservation
- Environmental Affairs
- Environmental Science

Environmental Horticulture
General Studies
Microbiology
Nutritional Sciences
Plant Biology
Soil Science
Tourism Planning and Development
Water Resources Management
Wildlife Management
Zoology

Bachelor of Science in Forestry
Forestry
- Forest Management
- Forest Science

The objectives of the College of Life Sciences and Agriculture are to give students a fundamental education in the biological, natural, and social sciences and to introduce them to the arts and humanities. In addition, advanced technical and professional courses are offered to prepare students for graduate school or entry-level positions in areas concerned with improving the quality of life. Preparation can vary from fundamental studies of cancer cells to community-service planning, resource protection to genetic engineering, and career teaching to molecular biology and biotechnology.

A blend of the basic and applied aspects of life sciences and agriculture, coupled with careful selection of supportive courses, ensures graduates the background and experiences necessary to be competitive in the job market. Potential employers include federal, state, and local governments; consulting firms; and industrial organizations. Graduates are employed as watershed, soil, and natural resource managers; associates in biomedical and agricultural research laboratories; marketing analysts and extension specialists; nutrition supervisors and environmental regulators; and information educators and communications experts.

Community governments employ graduates as service planners and land-use specialists, teachers in traditional and vocational education, public health technicians, and urban pest control specialists.

Positions are available in private and commercial organizations in production agriculture, food processing, landscaping, agribusiness, sales, and private planning. Graduates may also pursue entrepreneurial careers as greenhouse, nursery, farm, and natural resource managers; or as consultants, arborists, and environmental planners.

For those graduates with international aspirations, the Peace Corps and the Foreign Agriculture Service employ farm production experts, soil and water managers, market analysts, agricultural engineers, teachers, plant and animal breeders, and nutrition specialists.

Additionally, departments prepare students for advanced study in their chosen field of interest where graduate study is required for attaining their career goals.

Degrees

The college offers three undergraduate degrees: the bachelor of arts, the bachelor of science, and the bachelor of science in forestry. Some of the courses prescribed in these degree programs partially fulfill the general education requirements. Students should see their adviser for specific information.

Bachelor of Arts

The bachelor of arts degree is available in plant biology and zoology. Students must accumulate 128 credits, attain a 2.00 cumulative grade-point average, satisfy general education requirements, and complete a foreign language requirement (see Degree Requirements under University Academic Requirements for specific B.A. language requirements). Check individual departmental listings for specific major requirements and minimum acceptable grades in major courses.

Bachelor of Science

The bachelor of science degree is available in all departments or programs except forestry. University requirements are the same as for the bachelor of arts degree, except that a foreign language is not required and minimum acceptable grades may differ in some programs. Check individual departmental or program listings for specific major requirements.

Bachelor of Science in Forestry

The bachelor of science in forestry is a professional, designated degree available

to students majoring in forestry. (See Forestry for major requirements.)

General Science Certification

Students majoring in animal sciences, biochemistry, biology, environmental conservation, forestry, microbiology, plant biology, soil science, water resources management, wildlife management, zoology, or general studies may seek certification to teach science at the middle or junior high school level.

For further information, contact the coordinator of teacher education in the Department of Education.

Advising System

A member of the faculty whose area of interest is closely related to the student's is appointed as an adviser to assist the undergraduate in planning his or her academic program. Further advising is also available in the dean's office, Taylor Hall.

Undeclared Status

Students may select a major upon entering the college or may wait until registration for the sophomore year. Students who are uncertain about choosing a specific major may remain undeclared during their freshman year. In most cases they should take the following courses, after which they should be ready to declare a major:

Fall	Spring
CHEM 403	CHEM 404
BIOL 411	BIOL 412
General education requirement	General education requirement
LSA 400	An introductory course in any department in the college

Undeclared freshmen should explore possible majors by taking courses in the areas or programs that interest them most. They should talk to faculty, students, and their adviser concerning requirements, job opportunities, etc., in the various programs and should be prepared to declare a major when they register for the first semester of the sophomore year.

Combined Programs of Study

In addition to pursuing a single major, students may combine programs of study as follows (check University Academic Requirements for more information):
Minors: See page 19, see also page 21.
Second Majors: See page 21.
Dual-Degree Programs: See page 21.
Student-Designed Majors: See page 95.
Other combined and interdisciplinary opportunities: See page 100.

Interdisciplinary Minors

Agribusiness

The agribusiness minor is designed to provide students in disciplines other than environmental and resource economics training in the economics and management of agricultural and other natural resource business firms. This program prepares students to work for private companies, governmental agencies or nonprofit, nongovernmental organizations. Students who are interested in operating their own business will also find this minor very useful. The courses in the agribusiness minor emphasize the applications of economic and business management principles.

Required:
EREC 411, Environmental and Resource Economics Perspectives
EREC 501, Agricultural and Natural Resource Product Marketing
or
MKTG 550, Survey of Marketing
EREC 504, Business Management for Natural Resource Firms
EREC 606, Land-use Economics
EREC 715, Linear Programming and Quantitative Models

For additional information, contact Alberto B. Manalo, Environmental and Resource Economics Program Coordinator, 309 James Hall, (603) 862-3917

Community Planning

Land use and its impact on the quality of life has emerged as a major policy issue in New Hampshire, as well as at the national and global levels. Planning is a multidisciplinary profession that requires people who understand the technical tools and social concepts required to guide the selection and implementation of alternative schemes compatible with long term environmental and economic objectives. Students may supplement their major and general education course requirements with specific courses that will enhance their ability to find employment that requires knowledge of planning concepts and tools used in the formulation and implementation of effective land and resource planning by government agencies, non-profit organizations, and private business firms.

Required:
Group I-Theory and practice of planning (both courses required)
CD 614, Community Planning (prereq: EREC 411)
CD 777, Fundamentals and Practice of Community Planning (prereq: CD 614)

Group II-Tools and applications in planning (choose two)
CIE 505, Surveying (coreq: MATH 426)
NR 757, Photo Interpretation and Photogrammetry
NR 760, Geographic Information Systems in Natural Resources
SOIL 609, Soils and Community Planning
or
WARM 603, Watershed Water Quality Management (prereq: WARM 504 or permission)
SOC 660, Rural-Urban Sociology
or
AOE 510, Leadership Techniques in Diverse Populations
GEOG 590, Introductory Cartography

Group III-Resource management theory (choose one)
CD 717, Law of Community Planning
ECON 641 Public Economics (prereq: ECON 401, ECON 605, or permission)
POLT 503, Local Government and Politics
EREC 606, Land-use Economics
EREC 627, Community Economics and Finance (prereq: EREC 411 or ECON 402)
EREC 756, Rural and Regional Economic Development (prereq: ECON 605)
TOUR 767, Social Impact Assessment

Group IV-Additional complimentary electives (optional)
CD 794, Community Planning Internship
GEOG 582, Economic Geography
GEOG 583, Urban Geography

For additional information, contact Professor Edmund Jansen, Jr., Community Development Program Coordinator, 319 James Hall.

Genetics

The interdepartmental program in genetics involves faculty from the departments of animal and nutritional sciences, biochemistry and molecular biology, microbiology, plant biology, and zoology. Course descriptions can be found in the

genetics entry on page 161 of this catalog, as well as in the listings of the cooperating departments. M.S. and Ph.D. degrees in genetics are offered through the Graduate School. An undergraduate major in genetics is not currently offered. Undergraduates interested in genetics can pursue a minor (see requirements below). Students interested in preparing for graduate work in genetics should contact the chairperson of the genetics program early in their undergraduate careers for advice on courses.

Genetics Minor

Completion of 20 credits from the following courses is required for a minor in genetics. At least one course should be selected from each of the following subdisciplines of genetics:

Transmission Genetics:
GEN 702, Genetics Lab (prereq. BIOL 604)
GEN 722, Immunogenetics
GEN 753, Cytogenetics (prereq. BIOL 604)

Molecular Genetics:
GEN 706, Human Genetics
GEN 711, Genetics of Eukaryotic Microbes (prereq: MICR 503; BIOL 604)
GEN 715, Molecular Evolution (prereq: BIOL 604)
GEN 771, Molecular Genetics (prereq: BCHM 658 or 751; BIOL 604)
GEN 774, Plant Cell Culture and Genetic Engineering (prereq: BIOL 604)
GEN 782, Developmental Genetics (prereq: BIOL 604, BCHM 658 or 751)

Population and Quantitative Genetics:
GEN 705, Population Genetics (prereq: BIOL 604)
GEN 723, Quantitative Genetics (prereq: BIOL 604)

Marine Biology

The minor in Marine Biology, available to all students in the University, consists of 20 credits with grades of C- or better and no pass/fail courses.

Introductory course (choose one):
ESCI 501, Introduction to Oceanography
ZOOL 503, Introduction to Marine Biology
ZOOL 674, Field Marine Science

Interest concentration courses (choose four):
ANSC 623, Comparative Histology
BCHM 702, Endocrinology
CIE 747, Introduction to Marine Pollution and Control
EC 610, Coastal and Oceanic Law and Policy
EREC 611, Marine Resource Economics
ESCI 501, Introduction to Oceanography
MICR 707, Marine Microbiology
MICR 714, Water Pollution Microbiology
PBIO 625, Introduction to Marine Botany
PBIO 721, The Microscopic Algae
PBIO 722, Marine Phycology
PBIO 725, Marine Ecology
PBIO 727, Algal Physiology
TECH 797, Undergraduate Ocean Research Program
ZOOL 474, Introduction to Field Marine Science
ZOOL 628, Marine Invertebrate Evolution and Ecology
ZOOL 674, Field Marine Science
ZOOL 710, Ichthyology
ZOOL 711, Zooplankton Ecology
ZOOL 712, Mammalogy
ZOOL 720, Marine Biology for Teachers
ZOOL 722, Ecology of Marine Fishes
ZOOL 725, Marine Ecology
ZOOL 730, Underwater Research
ZOOL 740, Ciliophorology
ZOOL 750, Biological Oceanography
ZOOL 751, Experimental Marine Ecology
ZOOL 753, Marine Vertebrates
ZOOL 772, Fisheries Biology
ZOOL 775, Reproduction and Development of Marine Invertebrates
ZOOL 795, Underwater Research

Plant Pest Management

The Plant Pest Management minor provides a broad, but comprehensive, foundation in the concepts and practices employed in managing the major groups of pests that affect agricultural crops. It covers both the integrated pest management systems used in modern agriculture in developed countries and the agricultural practices used in developing countries. It is designed for students majoring in plant biology with career interests in commercial agriculture, agricultural industries, agricultural consulting, USDA regulatory service, economic entomology, plant pathology, integrated pest management, or Cooperative Extension. It also provides a strong background for students interested in pursuing advanced degrees required for these areas.

Required:
PBIO 651, Plant Pathology
PBIO 726, Integrated Pest Management

Select Three:
BIOL 541, General Ecology
NR 412, Introductory Entomology
ZOOL 530, Principles of Applied Entomology
FOR 506, Forest Entomology
PBIO 706, Weed Ecology
PBIO 708, Weed Ecology Lab
PBIO 752, Mycology

Further information may be obtained from the chairperson of the Plant Biology Department or any instructor teaching one of the required courses listed above.

Sustainable Living

Issues of sustainable living involve every aspect of life. To learn about sustainable living, there must be a community and bioregional context from which to build. The student must be aware of environmental issues and problems, have an understanding of ecology, increase his or her capacity to think about complex problems, and have hands-on learning experiences to approach effectiveness in sustainable living. Students taking the sustainable living minor will, at minimum, take the courses listed below. Courses should be taken in roughly the order listed.

Required:
EC 535, Contemporary Conservation Issues and Environmental Awareness or
FOR 502, The Endangered Forest, or equivalent
BIOL 541, General Ecology, or
FOR 527, Forest Ecology, or equivalent
EC 784, Sustainable Living
EC 785, Systems Thinking for Sustainable Living

Choose one of the following:
AOE 630, Development of Food and Fiber in Third-World Countries
EC 720, International Environmental Politics and Policies for the 21st Century
EC 724, Resolving Environmental Conflicts
EC 725, Environmental Communication and Advocacy
ECON 607, Ecological Economics
GEOG 673, Environmental Geography
PBIO 682, Sustainable Food Systems
SOIL 501, Introduction to Soil Sciences
WARM 504, Freshwater Resources
WARM 719, Wetlands Mitigation and Restoration

Choose one of the following:
EC 601, Environmental Conservation and Sustainable Living Internship
EC 687, Internship in Sustainable Living
EC 703, Applied Environmental Philosophy

For additional information please contact Dr. Robert Eckert, Natural Resources Department, James Hall.

Wetland Ecology

Students in Biology, Environmental Horticulture, Environmental Conservation, Forestry, Plant Biology, Soil Science, Water Resources Management, and Wildlife Management should consider obtaining a minor in Wetland Ecology. There is a stong demand among consulting firms, and state and federal agencies for employees with a knowledge and experience in wetland soils, vegetation, and hydraulic functions. Fulfilling the re-

quirements of this minor in combination with one of the above bachelor programs will enhance employment opportunities with these agencies.

Required:
PBIO 747, Aquatic Higher Plants
WARM 504, Freshwater Resources
WARM 711, Wetland Resource Management

Recommended:
SOIL 501, Introduction to Soil Sciences
SOIL 609, Soils and Community Planning
PBIO 717, General Limnology
PBIO 719, Field Limnology
PBID 721, The Microscopic Algae
PBIO 724, Freshwater Algal Ecology
WARM 603, Watershed Water Quality Management
WARM 700, Critical Analysis of Water Resources Literature
EREC 676, Economics of Water Use and Quality Management
WILD 615, Wildlife Habitats
WILD 710, Endangered Species Seminar
MICR 713, Microbes and the Environment

Programs of Study

Adult and Occupational Education

(For descriptions of courses, see page 120.)

The adult and occupational education program focuses on the preparation of students: as teachers of vocational/technical education, as participants in international agricultural education, as extension educators, and as adult educators concerned with human resource development.

This program complements a student major in technical subject matter within departments throughout the University and thus can serve as a viable dual major or minor.

Flexibility is maintained among individual programs, with credits allowed for qualified students through (1) the Occupational Competency Testing and Evaluation program, (2) internships in industry, (3) Cooperative Extension, and (4) other informal educational settings. Opportunity is provided for vocational teacher certification.

Students who desire to major or minor in adult and occupational education should consult with a member of the faculty of the program.

Students majoring in this program will normally concentrate in one of four areas, although programs for teacher education can be developed in other areas of vocational/technical education on an individual basis.

Areas of concentration are described below.

Agricultural Education Teacher Certification

This program prepares individuals for careers as teachers of agriculture. Individuals completing this concentration are eligible for state certification in New Hampshire and most other states. Recent occupational experience in the field of production agriculture or agribusiness is required for state certification.

Individuals are encouraged to complete a dual major in a technical agricultural field. For further information, contact David L. Howell.

AOE Required Courses	Credits
AOE 702, Concepts of AOE	4
AOE 650, Microcommunications	4
ADE 752, Youth Organizations	4
EDUC 750, Introduction to Exceptionality	4
AOE 791, Planning for Teaching	4
Total:	**20**
Required Education Courses	
EDUC 500, Exploring Teaching	4
EDUC 700, Educational Structure and Change	4
EDUC 701, Human Development and Learning, *or* FS 525, Human Development	4
EDUC 705, Alternative Perspectives on the Nature of Education	4
EDUC 694, Supervised Teaching in AOE	8
Total:	**24**

Forty credits of technical agriculture courses are selected from the following areas: (1) animal science; (2) plant biology; (3) agricultural mechanization; (4) environmental and resource economics; (5) forestry (fifth-year program); (6) some courses from the Thompson School of Applied Science or similar out-of-state institutions may be appropriate.

Additional Programs

Programs for teacher education can be developed in other areas of vocational/technical education on an individual basis.

Trade and Industrial Teacher Certification

Trade and industrial education, with emphases in, but not limited to, building trades and food service, is formulated in three categories of courses to fulfill degree requirements. The degree requirements are 44 credits in general education, 44 credits in professional education, and 40–50 credits in technical subject matter or documented recent occupational experience. Technical subject matter is culminated in a competency test where credit (up to 30 credits) is awarded for successful completion of a written and practical exam. The competency exam is used to evaluate a student's previous occupational experience, when appropriate. Recent occupational experience in the field of specialization is required for state certification. For further information, contact David L. Howell.

AOE Required Courses	Credits
AOE 650, Microcommunications	4
AOE 702, Concepts of AOE	4
AOE 752, Youth Organizations	4
EDUC 750, Introduction to Exceptionality	4
ADE 791, Planning for Teaching	4
Total:	**20**
Required Education Courses	
EDUC 500, Exploring Teaching	4
EDUC 700, Educational Structure and Change	4
EDUC 701, Human Development and Learning, *or* FS 525, Human Development	4
EDUC 705, Alternative Perspectives on the Nature of Education	4
EDUC 694, Supervised Teaching in AOE	8
Total:	**24**
Technical Courses	
AOE 696, Field Experience	
AOE 500, Occupational Competency Examination and Evaluation	
Total:	**40**

Adult Education

This program prepares students for careers with Cooperative Extension, industrial training, and within other informal educational settings. It includes opportunity for selected formal courses and for field experience valuable for the student's professional development. The most beneficial focus in this area may be a dual major or minor along with concentration in a technical subject matter field within the College of Life Sciences and Agriculture or within other colleges and schools of the University. For further information, contact David L. Howell.

AOE Required Courses	Credits
AOE 702, Concepts of AOE	4
AOE 650, Microcommunications	4

AOE 695, Investigations in AOE	2–4
AOE 696, Field Experience	2–16
AOE 783, Conducting and Supervising Adult Education Programs	4

Recommended Courses

CD 415, Community Development and Perspectives	4
CO 710, Community Development Seminar	2–4
EREC 504, Business Management for Natural Resource Firms	4
EREC 604, Financial Concepts for Natural Resource Firms	4
SOC 500, Introduction to Social Psychology	4
PSYC 401, Introduction to Psychology	4

Animal Sciences

(For descriptions of courses, see page 122. See also page 193 for description of Nutritional Sciences courses.)

The undergraduate animal sciences program at UNH provides students with fundamental and applied education in nutrition, reproduction, genetics, physiology, pathology, cell biology, and large animal management. Courses are offered in all areas of dairy and light horse production.

The Department of Animal and Nutritional Sciences is housed in Kendall Hall, a modern five-story animal research facility. This building houses the New Hampshire Veterinary Diagnostic Lab; an electron microscopy facility; and nutrition, physiology, and cell culture labs, all of which provide opportunities for students interested in basic animal sciences. The department maintains a light horse center and offers an equine program with courses in management, equine diseases, equine discipline, physical performance, and horsemanship specializing in dressage and combined training. Dairy facilities include housing for more than one hundred milking-age cows in the new $1.6-million Dairy Teaching and Research Center. Miniature swine are maintained at the Burley-Demerritt farm. Extensive poultry facilities also permit research and work experience in poultry science.

The animal sciences program offers two majors: animal science (with options in [1] equine sciences, [2] bioscience and technology, and [3] preveterinary medicine) and dairy management. In addition to satisfying the specific requirements of these majors or options, all animal science and dairy management majors must complete the University general education requirements. The department also offers a program in nutritional sciences.

The equine sciences option is intended to prepare students for a career in the equine industry. While the basic curriculum for this option provides students with the fundamental background in the equine sciences, preparation in a particular area of specialization is achieved by choosing courses from one of the following two areas of concentration: equine industry equestrian management or equine industry agribusiness management.

Students in the bioscience and technology option often specialize in nutrition, reproduction, genetics, or cell biology. This curriculum prepares students for advanced training in graduate school programs or in various medical professions; entry-level positions in biomedical, biotechnical, pharmaceutical, and other scientific companies; or technical positions in many research and medical units.

The preveterinary medicine option is designed to meet the academic requirements of most veterinary schools. Requirements may be met within three years, allowing students to apply to veterinary school during their senior year. However, most students finish their senior year, thus allowing more time for electives, concentration in areas of secondary interest, and completion of graduation requirements.

Employers in agriculture prefer to hire an agricultural graduate with extensive knowledge in a related field (e.g., computer science) rather than a graduate in one of these areas with no knowledge of agriculture. Hence, animal science students are encouraged to obtain training in a field that complements study in animal sciences. Such areas may include cell biology, biotechnical skills, communications, computer science, education, or business. This is generally accomplished by either taking a concentration of courses or obtaining a minor in a "specialty" area. Attainment of sufficient training in a "specialty" area enhances opportunity for employment. A careers course is offered to help students select and prepare for a particular career area.

Development of optional career goals is important for preveterinary students. Admission to schools of veterinary medicine is highly competitive. Therefore, students in this option are urged to prepare for alternative careers as they complete preveterinary requirements.

All animal science majors are required to complete ANSC 406; CHEM 403-404; and ENGL 501, 503, or 519. In addition, the requirements in one of the three following options must also be completed:

Equine Sciences Option

ZOOL 507-508; EREC 411 or ECON 402; BIOL 528 or PSYC 402 or SOC 502; ANSC 404, 609, 612, 620, 622, 625, 697, 796; two 700-level ANSC courses; and at least five courses from one of the following two groups: (A1.) Equine Industry Equestrian Management Group: ANSC 507, 604, 653-654; KIN 501; CMN 500 or MGT 580; EREC 501 or MKTG 550, EREC 504; DCE 491-492 or CS 401. (A2.) Equine Industry Agribusiness Management Group: ANSC 701, 724; EREC 501 or MKTG 550, EREC 504; DCE 491-492 or CS 401, MGT 580 and MGT 713.

Bioscience and Technology Option

BIOL 411-412; PHYS 401-402; MATH 424B; BIOL 528; MICR 503 or BIOL 541; ZOOL 507-508 or ZOOL 518 and 625/626; CHEM 545 or 651-652; BIOL 604; BCHM 658/659 or 751-752; ANSC 750 and three 700-level ANSC courses.

Preveterinary Medicine Option

BIOL 411-412; PHYS 401-402; MATH 424B; BIOL 528; MICR 503; ZOOL 507-508; BIOL 604; CHEM 651/653 and 652/654; BCHM 658/659; ANSC 750 and one 700-level ANSC course.

(For course requirements for the B.S. degree in dairy management, see Dairy Management.)

General Science Certification

See pages 34 and 84.

Biochemistry and Molecular Biology

(For descriptions of courses, see page 129.)

The field of biochemistry and molecular biology encompasses a broad range of the molecular life sciences, from biophysics and biochemistry to applied biology and medicine. The major in biochemistry is based on a solid foundation in biology, chemistry, mathematics, and physics. Advanced courses in biochemistry, molecular biology, cell and organismal biology, and genetics provide in-depth training and preparation for future careers. The depart-

ment offers specialized training in the areas of protein structure and function, molecular biology and molecular genetics, endocrinology, and biophysics. The department also provides opportunities for students to become involved in research projects sponsored by external granting agencies such as the National Science Foundation, National Institutes of Health, and others. This on-the-job experience is invaluable preparation for advanced postgraduate training or employment in a research laboratory.

The biochemistry major consists of a set of core requirements (Group I) and a set of required electives from several subject areas (Groups II-VI):

I. All of the following:
BIOL 411 & 412, Principles of Biology I & II
MICR 503, General Microbiology
BIOL 604, Principles of Genetics
CHEM 403-404 or 405, General Chemistry
CHEM 406 or 517, Quantitative Analysis
CHEM 547/549 & 548/550, Organic Chemistry,
or CHEM 651/653 & 652/654, Organic Chemistry,
or CHEM 545/546, Organic Chemistry
& BCHM 658/659, General Biochemistry
MATH 425 & 426, Calculus I & II,
or 424B, Calculus for Life Sciences &
BIOL 528, Applied Biostatistics I
PHYS 401 & 402, Introduction to Physics I & II,
or 407 & 408, General Physics I & II
BCHEM 751-752, Principles of Biochemistry
& 755, Laboratory in Biochemistry and Molecular Biology

II. One of the following molecular biology courses:
BCHM 711, Genetics of Eukaryotic Microbes
BCHM 765, Molecular Biology and Biochemistry of Plants
BCHM 771, Molecular Genetics
BCHM 782, Developmental Genetics

III. One of the following biochemistry courses:
BCHM 750, Physical Biochemistry,
or CHEM 683 & 684, Physical Chemistry I, II
BCHM 760, Cellular Signaling Processes
BCHM 763, Biochemistry of Cancer
BCHM 764, Membrane Biochemistry
BCHM 794, Protein Structure and Function

IV. One of the following cell and organismal biology courses:
BIOL 605, Eukaryotic Cell and Developmental Biology
BCHM 702, Endocrinology
ZOOL 777, Neurobiology and Behavior

V. One of the following laboratory techniques courses:
BCHM 754, Laboratory in Biochemistry and Molecular Biology of Nucleic Acids,
or 799, Senior Thesis,
or 795, Investigations in Biochemistry and Molecular Biology
ANSC 714, Research Methods in Endocrinology,
or 746, Animal Cell Culture,
or 751, Cell Culture,
or 752, Mammalian Cell Culture
CHEM 756, Advanced Organic Chemistry Laboratory,
or 763, Geological Engineering
GEN 702, Genetics Lab,
or 753, Cytogenetics
MICR 700, Pathogenic Microbiology,
or 704, Microbial Genetics,
or 705, Immunology,
or 706/708, Virology & Virology Lab,
or 717, Microbial Physiology
PBIO 774/775, Plant Cell Culture and Genetic Engineering & Lab
ZOOL 778, Neuroscience Techniques

VI. One additional course from groups II-V

Students interested in electing a biochemistry major are advised to consult with the department chairperson or a faculty member as early as possible to ensure the most effective curricular planning.

For first-year students with a strong high school preparation in both chemistry and mathematics (including calculus), the following schedule is recommended:

Fall	Spring
BIOL 411, Principles of Biology	BIOL 412, Principles of Biology II
CHEM 405, General Chemistry	CHEM 406, Quantitative Analysis
MATH 425, Calculus I	MATH 426, Calculus II
ENGL 401, Freshman English	General Education course

For first-year students lacking a strong background in chemistry and mathematics, the following schedule is recommended:

Fall	Spring
BIOL 411, Principles of Biology	BIOL 412, Principles of Biology II
CHEM 403, General Chemistry	CHEM 404, General Chemistry II
any course	MATH 424B, Calculus for Life Sciences
ENGL 401, Freshman English	General Education course

Approximately 50 percent of the students who graduate with a major in biochemistry seek advanced degrees.

The biochemistry curriculum provides most of the required and recommended courses for students seeking admission to professional schools in medicine, dentistry, veterinary medicine, and pharmacy; students who major in biochemistry can also use their training in conjunction with advanced degrees in law and business.

Many biochemistry majors go on to attend graduate school in all areas of the life and biomedical sciences, especially graduate programs in genetics, molecular biology, biochemistry, cell biology, and chemistry.

Recipients of an M.S. degree are more attractive to employers and often obtain better positions, greater salaries, and more responsibility and independence.

A Ph.D. degree is eventually required for those who wish to direct research programs, be involved in state-of-the-art scientific research, become a professor in a college or university, or obtain an executive position in a science-related area of industry or government.

Students obtaining the B.S. in biochemistry enjoy excellent job prospects upon graduation. There is currently a demand for skilled research technicians in biotechnology companies, drug companies, government agencies (National Institutes of Health, U.S. Department. Agriculture, Environmental Protection Agency, U.S. Food and Drug Administration, state labs), academic research laboratories, and hospitals. Students graduating in biochemistry have knowledge that can be valuable in the fields of management, sales, marketing, regulatory affairs, technical writing, and scientific journalism. With additional courses in education, the B.S. in Biochemistry permits graduates to teach science at the elementary, junior high, and high school levels.

General Science Certification

See pages 34 and 84.

Biology

(For descriptions of courses, see page 130.)
Students interested in earning a bachelor's degree in biology can choose one of the following options within the biology major: (1) ecology and evolutionary biology; (2) general biology; (3) marine and freshwater biology; and (4) molecular, cellular, and developmental biology. Majors in the following biological science departments are also available: (1) animal sciences, p. 82, (2) biochemistry, p. 82, (3) microbiology, p. 88, (4) nutritional sciences, p. 89, (5) plant biology, p. 89, or (6) zoology, p. 93.

Any of these majors is appropriate for those planning subsequently to earn M.S. or Ph.D. degrees; for those seeking a health-care-related professional degree; for those desiring biology teaching certi-

fication; and for those desiring employment in a wide variety of biology-oriented industries. Some examples of typical career areas for biology majors are biotechnology, pharmaceuticals, environmental consulting, environmental education, secondary school science teaching, college teaching and research, health-related professions, state or federal government services, science journalism, and marine biology. Students who wish to choose a departmental major should consult with that department for a more specific list of career opportunities.

New students wishing to major in a specific area within the biological sciences are encouraged to declare their major in the first year. Those generally interested in biology, but unsure of a specific major at this time should declare general biology to ensure a timely beginning of the core curriculum. In either case, each student will be assigned a faculty adviser. The adviser will assist in academic program development, course selection, and choice of major. Changing majors within the biological sciences is easy during the first two years since the biology core curriculum is common to all of the listed biological science majors.

Biology Core Curriculum

The core curriculum is substantially completed in the first two years as recommended below. Many core curriculum courses are also offered at UNH-Manchester. Students should discuss selection and sequencing of these courses with their adviser because deferral of some core courses may be desirable for specific departmental majors, and the courses chosen may vary slightly depending on the major. The biology core curriculum satisfies the four University general education requirements in groups 2 and 3.

Freshman Year
BIOL 400* and 411-412; CHEM 403-404, MATH 424B

Succeeding Years
MICR 503**; BIOL 541**; BIOL 528; CHEM 545 and BCHM 658/659 *or* CHEM 651/653-652/654***; PHYS 401-402; BIOL 604, ENGL 501, 503, or 519***, EDUC 500†

* BIOL 400 is required for first-year biology majors only
** Biology majors take both. Departmental majors choose one as instructed by the department.
*** For premedical and prehealth-related professions only.
† For those preparing for teacher certification only

Academic Requirements

Students qualify for a B.S. degree in biology when they have completed 128 credit hours of courses with a cumulative 2.0 GPA, including University general education requirements and requirements for one of the four biology options described below.

The minimum grade acceptable for courses required by the major is D-. Students who expect to compete successfully for admission to post-baccalaureate degree programs should maintain a cumulative GPA of 3.0 after the end of the sophomore year.

Biology Major Options

A complete list of approved courses for each option can be found in *The Biology Curriculum Guides*, available from the Biology Program Office in Taylor Hall, from a biology faculty adviser, or on the biology Web page at http://arethusa.unh.edu/colsa/biology/index.htm

Ecology and Evolutionary Biology. Eight courses in addition to core curriculum courses must be selected from those listed in the Ecology and Evolutionary Biology Curriculum Guide.

General Biology. Within the biology core, BIOL 528 and BCHM 658/659 are preferred. Eight courses in addition to core curriculum courses must be selected from those listed in the General Biology Curriculum Guide.

Marine and Freshwater Biology. BIOL 528 and BCHM 658/659 are preferred in the core. If possible students should consider enrolling in ZOOL 674, a 6-credit summer experience at the Isles of Shoals Marine Laboratory, in the summer following the freshman year. A senior project or undergraduate research experience is also strongly recommended. Eight courses in addition to core curriculum courses must be selected from those listed in the Marine and Freshwater Biology Curriculum Guide.

Molecular, Cellular, and Developmental Biology. CHEM 651/653-652/654 are preferred in the core. Eight courses in addition to core curriculum courses must be selected from those listed in the Molecular, Cellular, and Developmental Biology Curriculum Guide.

Prehealth Professional Program

Students wishing to pursue postgraduate degrees in the health care professions should visit the premedical advising office in 9 Hood House. For additional information, call 862-3625 or visit the department's Web page at: http://www.unh.edu/premed-advising

Biology Teacher Certification and General Science Certification

Biology teacher certification for students preparing to teach high school biology can be obtained through the Department of Education's five-year, undergraduate-graduate degree program. Students are required to take EDUC 500 (preferably in the sophomore year), earn a bachelor's degree in one of the biological sciences, and complete a fifth year, which includes an internship and coursework leading to a master's degree in education. General science certification for students preparing to teach science in middle and junior high schools can be obtained through the Department of Education's general science certification program. For further information, see the Education section in College of Liberal Arts or contact the teacher education coordinator in the Department of Education.

Biology Minor

A minor in biology can be earned by completing the following requirements: (1) BIOL 411-412 or PBIO 412 and ZOOL 412; (2) one course from each of the three major organism groups: (a) animals (ANSC or ZOOL courses), (b) microbes (MICR courses), and (c) plants (PBIO courses); (3) two additional biological sciences courses at the 600-700 level.

Students interested in a biology major or minor should contact the Biology Program Office, Taylor Hall, 862-3066.

Community Development

(For descriptions of courses, see page 137.)

The community development program prepares students for professional careers as local government administrators, town or regional land-use planners, and community facilitators and educators. It is an applied social science degree program that gives the student an understanding of the interrelated social, economic, political, environmental, and technical factors that influence a community and its

residents. The curriculum takes an interdisciplinary approach and includes field experience and internships as vital components that complement classroom and independent research.

Students majoring in community development are encouraged to concentrate in one of three areas: (1) community change and development, (2) community public administration, and (3) community and regional planning. These areas of specialty provide the necessary background and training to prepare graduates for entry-level positions with local municipalities and agencies throughout the nation. The community development program also provides a firm base for graduate study in a variety of areas such as regional planning, public administration, rural sociology, economic development, and law.

A minor in community development or community planning provides opportunities for students in other areas to better understand the application of their knowledge to specific community issues. A community development minor complements majors in both technical fields and liberal arts.

Local municipalities in New England are turning to full-time professional administrators to assume responsibility for the day-to-day administration, management, and planning activities that were previously carried out by part-time town officials. Officials at the New Hampshire Municipal Association estimated that New Hampshire needs, each year, at least twenty-five new graduates in community and public administration to fill local government professional needs. In addition to professional administration or planning positions in local or regional government, employment opportunities are also available with public agencies and organizations at the state, national, and international levels.

Students interested in the challenges of community development consult with the program coordinator or with the chairperson of the Department of Resource Economics and Development.

Required Courses

I. All of the following (16 credits):
CD 415, Community Development and Perspectives
CD 508, Applied Community Development
CD 795, Investigations in Community Development *or*
CD 793, Community Administration Internship *or*
CD 794, Community Planning Internship
EREC 525, Statistical Methods and Applications

II. One of the following (4 credits):
CD 777, Fundamentals and Practice of Community Planning
EREC 506, Population, Food, and Resource Use in Developing Countries
GEOG 583, Urban Geography
TOUR 767, Social Impact Assessment

III. At least three courses from the following (Minimum of 12 credits):
CD 607, Community Administration and Development
CD 614, Community Planning
CD 627, Community Economics and Finance
CD 710, Community Development Seminar
CD 717, Law of Community Planning
EREC 606, Land Use Economics

IV. Two courses from two of the following groups (at least 6 credits):
A: SOIL 609 or BIOL 541
B: SOC 645
C: MGT 580, 712, or 713

V. The following three courses:
MATH 420, Finite Mathematics
EREC 411, Environmental and Resource Economics Perspectives
CMN 500, Public Speaking *or* AOE 650, Microcommunications

Dairy Management

(For descriptions of courses, see page 122.)
The dairy management program, offered by the Department of Animal and Nutritional Sciences, is designed to provide students with solid training in areas important to the successful management of a dairy enterprise, for employment in related agribusinesses (e.g., pharmaceutical and feed industries), or for those wishing to pursue additional training leading to the M.S. or Ph.D. degree in dairy science or its related disciplines. Dairy management students receive training in areas such as nutrition, reproduction, diseases, genetics, lactation physiology, forages, agribusiness finance, personnel management, computer science, and public relations. In addition, senior students enrolled in this program will be given complete responsibility for managing the UNH teaching herd with other students, thereby acquiring actual management experience along with their basic subject matter training. The UNH Teaching and Research Center, a modern dairy facility, houses approximately one hundred milking cows plus a similar number of nonlactating animals.

In addition to the University's general education requirements, a typical dairy management student will take the following courses:

First Year
ANSC 508 (optional), 552, 554, 603; BIOL 411; CHEM 403-404, ENGL 401; EREC 411

Second Year
ANSC 432, 511, 512, 612, 650; CS 401; PBIO 421; EREC 504

Summer Internship
ANSC 600

Third Year
ANSC 609, 630, 650, 701, 715; EREC 604

Fourth Year
ANSC 698, 708, 710, 724, 727, 728, 743; MGT 580 or 713

Environmental and Resource Economics

(For descriptions of courses, see page 154.)
This program offers training in environmental and resource economics, including public resource policy, resource management, natural resource and environmental economics, and community economics and finance. This program emphasizes applied economics in the context of public policy. Training is also available in agricultural economics, including agribusiness, small business management, food marketing, agricultural policy, and world food supplies.

Students majoring in environmental and resource economics will normally concentrate in one of the following three areas: environmental and natural resource economics, agricultural economics, or community economics. In addition, students must satisfy general education requirements, which lead to a broad university education. Majors interested in the economic or business aspects of agriculture and natural resources will be expected to take courses in the biology departments.

Students majoring in any of the social science, life science, and agriculture departments of the University may find it to their advantage to elect courses or a minor in environmental and resource economics or agribusiness. By doing so, their basic training can be supplemented in a specific area of interest, such as resource development and natural resource policy for social science majors, farm management and agricultural marketing for agricultural majors, and community economics and finance for students interested in local government and development.

Required Courses
All of the following:
ECON 401, Principles of Economics (Macro)
EREC 411, Environmental and Resource Economics Perspectives
EREC 504, Business Management for Natural Resource Firms
MATH 420, Finite Mathematics, *or* MATH 424B, Calculus for Life Sciences
ECON 605, Intermediate Microeconomic Analysis
ECON 611, Intermediate Macroeconomic Analysis, *or* ECON 635, Money & Banking
EREC 525, Statistical Methods and Applications

At least five of the following, of which two must be 700 level:
EREC 501, Agricultural and Natural Resource Product Marketing
EREC 506, Population, Food, and Resource Use in Developing Countries
EREC 604, Financial Concepts for Natural Resource Firms
EREC 606, Land Use Economics
EREC 611, Marine Resource Economics
EREC 627, Community Economics and Finance
EREC 633, Economics of Travel and Tourism
EREC 666, Empirical Resource Economics: Methods and Techniques
EREC 676, Economics of Water Use and Quality Management
EREC 704, Economics of Policy Issues in Food and Natural Resource Use
EREC 708, Environmental Economics
EREC 710, Environmental and Resource Economics Seminar
EREC 715, Linear Programming and Quantitative Models
EREC 756, Rural and Regional Economic Development

Students who major in environmental and resource economics are qualified for a wide variety of opportunities upon graduation. Private business, public institutions, and government agencies currently have a strong demand for specialists trained in natural resource development; land and water use policy; natural resource and small business management; agricultural, fisheries, and forestry marketing; and community development. In many cases, students may wish to improve their qualifications by pursuing more specialized graduate studies in one or more of the above areas.

Departmental Honors

Honors in environmental and resource economics will be awarded to students who complete 16 credits of honors courses in environmental and resource economics (including a minimum of 4 credits of a senior research project), and who maintain a minimum grade-point average of 3.20 in the major. Students interested in the environmental and resource economics honors program should contact the environmental and resource economics chairperson in James Hall for more information.

Students interested in a major or minor in environmental and resource economics or agribusiness should contact Alberto B. Manalo at 862-1700.

Environmental Conservation

(For descriptions of courses, see page 155.)
The program in environmental conservation provides a broad background for understanding environmental and resource problems and their solutions. Development of policies and planning are essential to resolving environmental problems and require a foundation in biology as well as economics.

Students must choose a 32-credit option (environmental affairs or environmental science) or develop a concentration that is related to specific career goals (for example, in the areas of environmental education, ecology, or conservation biology). Students choosing the latter route must incorporate a minor into their concentration. In addition to courses in the options or concentrations, student must complete the seventeen core courses listed below. Courses in the EC program major must be completed with a grade of C- or better.

Minor in Environmental Conservation

A minor consisting of five courses in environmental conservation is available for students majoring in other areas.

Environmental Conservation Off-Campus Programs

The environmental conservation program offers two programs which provide an option to spend a semester abroad. The Geocommons Program offers 12 credits in sustainable living (EC 674, 675, and 676) by providing semester experiences in communities that are striving for sustainability in India and France. Emphasis is on the human dimensions of community-building, ecological design, and a sense of place. The UNH-EcoQuest New Zealand Program provides highly motivated students with the opportunity to engage in a unique multi-disciplinary, research-oriented field study program. Four fully integrated courses (EC 660, 661, 662, and 663 for 16 credit hours) focus on the ecological, resource management, conservation and sustainability issues important to the natural environment, economy, and culture of New Zealand over a full semester. Alternatively, students can participate in a summer session five-week two-course intensive (EC 660, 662 for 8 credit hours). Students engaged in this learning community will examine unique ecosystems, watershed scale restoration, and undertake a problem-solving, hands-on integrated approach to resource management investigations which incorporate cultural, economic, and policy dimensions of the New Zealand environment. UNH EcoQuest New Zealand Program Coordinator: Dr. Mimi Larsen Becker.

The following seventeen courses are required of all majors:
NR 401, Natural Resources Perspectives
PBIO 412, Introductory Botany
ZOOL 412, Principles of Zoology

Ecology Electives: Check all courses for prerequisites.
Choose TWO of the following:
You must take one of the following courses **FIRST:**
FOR 423, Dendrology
FOR 425, Field Identification of Trees and Shrubs
WILD 433, Wildlife Ecology
PBIO 566, Systematic Botany
ZOOL/PBIO 503, Intro to Marine Biology
BIOL 541, General Ecology

Select your **SECOND** course from the following:
FOR 527, Forest Ecology
PBIO 724, Freshwater Algal Ecology
PBIO/ZOOL 725, Marine Ecology
PBIO 742, Physiological Ecology
PBIO 745, Community Ecology

EREC 411, Environmental and Resource Economics Perspectives

CHEM 403, General Chemistry

Economics Elective: Choose one of the following.
ECON 605, Intermediate Microeconomic Analysis
ECON 607, Ecological Economics
ECON 645, International Economics
ECON 668, Economic Development
ECON 669, Women and Economic Development
ECON 670, Economics of Energy
ECON 707, Economic Growth and Environmental Quality
EREC 606, Land Use Economics
EREC 611, Marine Resource Economics
EREC 627, Community Economics and Finance
EREC 676, Economics of Water Use and Quality Management
EREC 708, Environmental Economics
FOR 643, Economics of Forestry

NR 602, Natural Resources and Environmental Policy

EC 702, Ecological Values and Ethics

WARM 504, Freshwater Resources

SOIL 501, Introduction to Soil Sciences

One Communication Skills course:
AOE 650, CMN 500, THDA 555, 621, 622, 624

One Writing Skills course:
ENGL 501, 503, 519, 529

One Statistical Skills course:
BIOL 528, PSYC 402, SOC 502, or equivalent

EC 637, Practicum in Environmental Conservation, 4 credits. The practicum is a student-initiated independent project involving field work on an actual conservation activity, off campus, during the senior year There is a 100-hour minimum time commitment which may be public service or for pay

NR 775, Natural Resources Senior Project

Students should plan to work for a master's degree if they wish to be professional conservationists. The undergraduate degree offers an education in environmental conservation with the opportunity for specialization or generalization in related fields.

All students must complete the University general education requirements.

Students interested in a major may consult with the program coordinator, Robert Eckert, James Hall.

General Science Certification

See pages 34 and 84.

Forestry

(For descriptions of courses, see page 159.)

Forestry is the art and science of managing and understanding the natural and human dimensions of forests and forest use. The forestry program is designed to provide graduating professionals with a sound technical preparation and a broad general education. The forest management and forest science options of the forestry major leading to the bachelor of science in forestry degree (B.S.F.) are accredited by the Society of American Foresters (SAF). The SAF is recognized by the Council on Postsecondary Accreditation and the U.S. Department of Education as the accrediting body for forestry in the United States.

Professional foresters are employed by private industry, public agencies, public interest firms, groups, educational institutions, research organizations, and consulting firms. Some graduates work toward natural resource protection and the improvement of environmental quality. Others are employed in the production and utilization of raw materials; still others become involved with wildlife, watershed, and recreation management and other aspects of ecosystem management. There are rapidly expanding opportunities in international forestry. Many students enter graduate school for advanced training in forest biology or forest management.

Technical, administrative, and managerial skills are required of all professional foresters. This program provides a foundation in scientific knowledge, as well as technical and managerial skills, with elective freedom to cultivate special abilities and interests.

Students majoring in forestry must complete 130 credits of classroom work and 4 credits of field training. University general education requirements are included in this total.

Besides these formal courses, all forestry majors are required to have at least one summer of forestry work experience (FOR 500). While students are responsible for their own summer work, placement assistance is available from the faculty.

In the junior year, students must choose to concentrate in either of the following options (and must earn 24 credits within that concentration to graduate):

Forest Management Option

This option is designed for students who intend to plan a career in forest resource management. Requirements: NR 753, Decision Sciences in Natural Resource Management; FOR 754, Wood Products Manufacture and Marketing; RMP 711, Recreation Resource Management; one course in administration, 500 level or higher; two courses (8 credits) in advanced forestry, wildlife, hydrology, soils, resource management, urban forestry, recreation, or administration.

Forest Science Option

In this option, students may specialize in specific forest sciences as background for graduate school or focus their interests in areas other than forest management. Areas of concentration include genetics, forest ecology, wood science, watershed management, or the social sciences. Students in this option are encouraged to minor in the area of their choice.

Minors

Nonforestry majors may minor in forestry by completing 20 to 22 credits of coursework approved by the forestry program faculty.

Freshman Year
FOR 423, Dendrology
FOR 425, Field Identification of Trees and Shrubs
FOR 426, Wood Science and Technology
FOR 542, Forestland Measurement and Mapping
BIOL 528, Applied Biostatistics I
ENGL 401, Freshman English
MATH 424B, Calculus for Life Sciences
NR 401, Natural Resources Perspectives
PBIO 412, Introductory Botany
One Oral Communication Skills Course

Sophomore Year
FOR 500, Work Experience
FOR 527, Forest Ecology
FOR 544, Forest Biometrics
FOR 506, Forest Entomology
CHEM 403, General Chemistry
EREC 411, Environmental and Resource Economics Perspectives
or ECON 402, Principles of Economics (Micro)
SOIL 501, Introduction to Soil Sciences
WILD 433, Wildlife Ecology
General Education Elective 4, 5, 6, or 8
General Education Elective 4, 5, 6, or 8

Junior Year
FOR 629, Silviculture
FOR 643, Economics of Forestry
FOR 652, Forest Resources Assessment
FOR 660, Forest Fire Protection
NR 602, Natural Resources and Environmental Policy
PBIO 651, Plant Pathology
Professional Option
General Education Elective 4, 5, 6, or 8
General Education Elective 4, 5, 6, or 8

Senior Year
FOR 745, Forest Management
NR 775, Natural Resources Senior Project

NR 757, Photo Interpretation and Photogrammetry
Professional Option
Professional Option
Professional Option
Professional Option
WARM 603, Watershed Water Quality Management
General Education Elective
4, 5, 6, or 8

Students interested in the forestry program may consult with the program coordinator, Richard Weyrick, James Hall.

General Science Certification
See pages 34 and 84.

General Studies

General studies provides a flexible curriculum for students with a broad, general interest in several areas of life sciences and agriculture. It cuts across departmental lines and in some respects resembles a self-designed major. General studies is not intended to be a catch-all for students from other colleges, but is designed to serve the needs of life sciences and agriculture students. Requirements for a general studies major are CHEM 403-404; BIOL 411-412 (or PBIO 412 and ZOOL 412); PHYS 401-402; and six additional courses in the college (or closely related courses approved by the adviser) two of which must be at the 600 level and two at the 700 level. These courses should be interrelated in such a way that they will help students meet their goals for employment or further study.

Freshmen who are unsure of a major should not declare general studies as a major but should remain undeclared for a semester or two (see Undeclared Status). The program is generally not available to students entering their senior year.

Genetics Program

An undergraduate degree in genetics is not offered at the University of New Hampshire. In the Graduate School, the M.S. and Ph.D. degrees are offered in an interdepartmental genetics program, involving the departments of animal and nutritional sciences, biochemistry and molecular biology, microbiology, plant biology, and zoology. See the genetics entry in the course descriptions of this catalog (p. 151) as well as other genetics courses offered by the cooperating departments within the genetics program. Students interested in preparing for graduate work in genetics at UNH or elsewhere should contact the chairperson of the genetics program early in their undergraduate careers for advice on courses.

Microbiology

(For descriptions of courses, see page 186.)
Microbiology explores the world of organisms too small to be seen with the unaided eye. The primary emphasis in the Department of Microbiology is on prokaryotes (bacteria and archaea) and viruses. The curriculum provides basic familiarity with microorganisms, their interactions with other life forms (including humans), and their roles in natural systems and processes.

Baccalaureate degree holders in microbiology secure positions in industry (food and beverage, pharmaceutical, bioproducts, etc.); in city, state, and federal agencies (public health, environmental quality, regulatory, etc.); or in universities or research institutes.

The Department of Microbiology offers programs of study leading to the bachelor of science degree. Microbiology is widely recognized as being both a basic life science and a highly pragmatic applied science. Two curricula within the microbiology program are intended to accommodate the diverse needs of potential students. *Curriculum A* is recommended for individuals intending to enter the work force or pursue graduate education in the biological sciences, biomedicine, or biotechnology. It also provides for entry into professional programs such as dentistry, human medicine, or, with little additional preparation, veterinary medicine. *Curriculum B* is appropriate for students planning to enter the work force immediately upon graduation, as research technicians, applied scientists, or in sales or marketing positions in the life sciences or biotechnological enterprises. This curriculum would be appropriate for transfer students from other colleges or universities as well as for students planning to pursue a degree in business, including the M.B.A., as appropriate for careers in managing diagnostic laboratories or in hospital administration.

Each curriculum is satisfied by Microbiology Group One and Group Two course requirements. Group One courses are common to all students in that curriculum. Group Two requirements are satisfied by choosing at least one microbiology course from each of three categories: medical, general, and ecological. Students are required to complete seven microbiology courses totaling a minimum of 28 credits (including MICR 503) for a major in microbiology.

Curriculum A

Curriculum A has the following Group One requirements: BIOL 411-412, 604; BCHM 658-659 or 751-752, 755; BIOL 528 or equivalent; CHEM 403-404, 545-546 or 651/653, 652/654; MATH 424B; MICR 503, 700, 704, 705; PHYS 401-402. Group Two requirements may be satisfied by choosing at least one course from each of the following areas: medical (MICR 702, 706; MLS 720); general (MICR 600, 710-712, 711, 716, 717, 718, 751, 752); and ecological (MICR 707, 713-715, 714; PBIO 721).

Curriculum B

Students entering this program as freshmen will be advised to adhere closely to the biology core curriculum. However, students may also transfer into the microbiology program from liberal arts, health sciences, or other science programs via this curriculum. Curriculum B has the following Group One requirements: BIOL 411-412 or two semesters of a laboratory biological science may be accepted upon approval; BCHM 658/659; CHEM 403-404, 545-546; MATH 424B; MICR 503. Group Two requirements may be satisfied by choosing at least one course from each of the following areas: medical (MICR 700, 702, 705, 706, 708); general (MICR 600, 704, 710-712, 711, 716, 717, 718, 751, 752); ecological (MICR 707, 713; 714; PBIO 721). Other microbiology-related courses offered in the following departments may be taken with an adviser's permission: animal sciences, biochemistry and molecular biology, plant biology, civil engineering, zoology, or medical laboratory science. Courses in these areas are reviewed periodically by the microbiology faculty to ascertain their suitability for microbiology majors.

Special Projects in Microbiology (MICR 795) is available by special permission and allows students the opportunity to conduct semi-independent research projects in conjunction with departmental

faculty. Up to 4 credits of Problems in Microbiology may be applied to major requirements, although students may enroll for additional hours. Students must receive a minimum grade of C– in major requirements taught in the College of Life Sciences and Agriculture (e.g., microbiology, biology, or biochemistry). A passing grade in major requirements taught outside the College of Life Sciences and Agriculture (e.g., chemistry, math, or physics) is acceptable.

Students planning to attend graduate or postgraduate professional school or to apply for certification as registered microbiologists through the American Society for Microbiology are strongly advised to take a course in quantitative analysis (CHEM 517-518).

Individuals considering a major in microbiology are strongly encouraged to enroll in MICR 503 and organic chemistry in their sophomore year. Requirements in the biology core curriculum may be deferred until the subsequent year, if necessary.

Students may obtain a minor in microbiology by successfully completing MICR 503 and four additional departmental courses totaling a minimum of 20 credits at the 600 or 700 level. BCHM 658/659 may be substituted for one of these courses. A maximum of 4 credits of Problems in Microbiology may be applied to the minor.

Departmental Honors

Honors in microbiology will be awarded to students who complete 16 credits of honors courses in microbiology (including a minimum of 4 credits in a senior research project), and who maintain a minimum grade-point average of 3.20 in the major. Students interested in the microbiology honors program should apply to the department before their junior year.

Students wishing to declare a major or minor in microbiology or to be admitted to the microbiology honors program should consult Robert M. Zsigray.

Nutritional Sciences

(For descriptions of courses, see page 193 and page 122, Animal Sciences.)

The science of nutrition is the study of nutrients in food and the body's handling of these nutrients. As an applied science, nutrition is based on biochemistry and physiology but can also include anthropology, economics, genetics, microbiology, pathology, animal sciences, and zoology. Consequently, the nutritionist often cooperates with workers in many different fields. The nutrition program at UNH is designed to permit specialized study in human and/or animal nutrition.

Two curricula are offered to meet the educational needs of students with differing professional aspirations.

Basic Science Curriculum

This curriculum provides students with a solid science background in biology, chemistry, physiology, nutrition, biochemistry, and physics. Upon graduation, students are well prepared for technically oriented jobs in science. This curriculum is also excellent preparation for students planning further education in graduate school or professional schools of medicine and dentistry. Students in this curriculum are required to complete the biology core curriculum: NUTR 475, 750; ANSC 511 and 512; MICR 503; BCHM 658/659; and 12 additional credits from recommended courses in nutrition.

Dietetics Curriculum

Approved by the American Dietetics Association (ADA), the dietetics curriculum prepares students to apply for a postgraduate dietetic internship. Completing this internship and passing the ADA examination are essential for becoming a registered dietitian (RD), requisite for employment opportunities in clinical dietetics and community nutrition. Required courses for this curriculum are NUTR 401, 405, 475, 476, 473, 503, 504, 510, 550, 650, 720, 750, 773, 775, and 780; ANSC 511 and 512; CHEM 403-404, and 545-546; ENGL 401; DCE 491; MICR 501 or 503; BCHM 658/659; SOC 500 or PSYC 401; MGT 580; HMP 710; and either PSYC 402, SOC 502, BIOL 528, or HHS 540.

Plant Biology

(For descriptions of courses, see page 199.)

Plant biology is the study of plants at the population, organismal, cellular, and molecular level; and the investigation of the uses of plants for food, fiber, recreational, and ornamental purposes. Offerings in marine and freshwater plant biology also are provided and are facilitated by the Jackson Estuarine Laboratory and two marine laboratories where the plant biology faculty maintains an active involvement in teaching and research. The Department of Plant Biology offers three baccalaureate degrees: bachelor of science in plant biology, bachelor of science in environmental horticulture, and bachelor of arts in plant biology. See also programs listed under biology major and marine sciences.

B.S. in Plant Biology

This degree is for students intending to seek employment in agricultural, pharmaceutical, and biotechnology industries; to work in governmental agencies, environmental groups, and consulting firms; to teach secondary education; or to undertake graduate studies in preparation for advanced research and teaching positions. Students interested in university teaching and/or research, and governmental and industrial research, should plan to complete an advanced degree in the field.

Students are required to take the core courses, which include the biology core curriculum, and six plant biology elective courses.

Core Courses	Credits
BIOL 411, Principles of Biology I	4
BIOL 412, Principles of Biology II	4
CHEM 403, General Chemistry I	4
MATH 424B, Calculus for Life Sciences	4
MICR 503, General Microbiology	5
or BIOL 541, General Ecology	4
BIOL 528, Applied Biostatistics I	4
CHEM 545/546, Organic Chemistry and Lab	5
BCHM 658/659, General Biochemistry and Lab	5
PHYS 401, Introduction to Physics I	5
PHYS 402, Introduction to Physics II	4
BIOL 604, Principles of Genetics	4
PBIO 401, Plant Biology Orientation	1
PBIO 701/702, Plant Physiology and Lab	5
PBIO 774, Plant Cell Culture and Genetic Engineering	3
PBIO 566, Systematic Botany	4
or PBIO 668, Summer Flora of NH	4
or PBIO 703, Evolutionary Survey of the Plant Kingdom	5

Plant Biology Electives

Six additional courses must be selected from those listed below under categories 1-5, with the priviso that no more than four courses from one category can be used to fulfill the requirement. It is strongly recommended that students choose courses from as many of the categories as possible to obtain a broad background in plant biology

Category 1 Systematics, Ecology, and Evolution
PBIO 566, 625, 668, 703, 717, 719, 721, 722, 724, 742, 744, 745, 747, 752, 758, 761.

Category 2: Marine and Freshwater Plant Biology
PBIO 503, 625, 717, 719, 721, 722, 724, 725, 747.

Category 3: Plant Structure and Physiology
PBIO 709, 711, 713, 714/715, 727/729, 751, 758, 764, 765, 774/775.

Category 4: Ornamental and Crop Science
PBIO 546, 547, 565, 572, 651, 652, 655, 678, 682, 689, 706/708, 726; NR 412; ZOOL 530; FOR 506.

Category 5: Plant Genetics and Biotechnology
PBIO 714/715, 753, 754, 764, 765, 773, 774/775; BCHM 771; GEN 702, 705.

B.S. in Environmental Horticulture

This program offers a flexible curriculum for students interested in a multifaceted view of plant agriculture that also embraces issues of environmental stewardship, food safety, international development, and other topics of broad public concern. A degree in environmental horticulture will prepare students for careers managing greenhouses, nurseries, farms, and golf courses; in teaching; in consulting and applied research; in practicing journalism; in working for park and highway planning commissions; in working in sales or brokerage aspects of wholesale and retail marketing; and in finding employment in food- and feed-processing firms.

Students are required to take the core courses, support courses, and 20 credits of elective courses.

Core Courses	Credits
PBIO 401, Plant Biology Orientation	1
PBIO 412, Introductory Botany	4
PBIO 421, Concepts of Plant Growth	4
PBIO 501, Basic Biochemistry or BCHM 658/659 General Biochemistry (5 cr)	3
PBIO 546, Plants, Soils, and the Environment	4
PBIO 547, Environmental Horticulture	4
PBIO 572, Plant Propagation	4
PBIO 566, Systematic Botany	4
PBIO 600, Field Experience (Horticulture Related)	4
PBIO 701, Plant Physiology	3
PBIO 612, Plant Genetics and Reproduction or BIOL 604, Principles of Genetics	4
PBIO 651, Plant Pathology	4
PBIO 726, Integrated Pest Management	4
PBIO 797, Senior Seminar	1

Electives
A minimum of 20 credits (including at least 12 credits at 600 or 700 level)

PBIO 407, Sustainable Gardening	4
PBIO 557, Small Fruit Crop Management	2
PBIO 565, Turf Management	4
PBIO 652, Vegetable Crops	4
PBIO 655, Tree Fruit Management	3
PBIO 668, Summer Flora of New Hampshire	4
PBIO 678, Ornamental Plants	4
PBIO 682, Sustainable Food Systems	4
PBIO 689, Herbaceous Landscape Plants	4
PBIO 730, Plant Growth Research and Modeling	4
PBIO 706, Biology of Weeds	2
PBIO 708, Biology of Weeds Laboratory	2
PBIO 795, Investigations in Plant Biology (Horticulture-related project)	2–4

Support Courses Required From Other Departments

CHEM 403, General Chemistry I	4
CHEM 404, General Chemistry II	4
ZOOL 530, Principles of Applied Entomology	4
EREC 411, Environmental and Resource Economics Perspectives	4

B.A. in Plant Biology

Students must complete a minimum of 40 semester credits in the major. The curriculum provides a broad background in the liberal arts and plant biology. Students may enter this program as freshmen or transfer into it from other liberal arts or science programs. This program is of particular interest to students who intend to utilize their plant biology training in public relations, teaching, or other related careers in combination with a liberal arts background. The program allows for obtaining minors in other fields such as English, history and philosophy of science, international affairs, education, art, and the like, to create an interdisciplinary program, or to pursue a double major.

Requirements	Credits
PBIO 401, Plant Biology Orientation	1
PBIO 412, Introductory Botany *or* BIOL 411-412, Principles of Biology I & II	4
PBIO 501, Basic Biochemistry or CHEM 545/546, Organic Chemistry & Lab	3 5
BIOL 541, General Ecology	4
PBIO 566, Systematic Botany *or* PBIO 668, Summer Flora of N.H.	4
BIOL 604, Principles of Genetics *or* PBIO 612, Plant Genetics and Reproduction	4
PBIO 701/702, Plant Physiology	5
PBIO 774, Plant Cell Culture & Genetic Engineering	3

Plant Biology Electives
12 credits minimum
Highly recommended: Select upper-level electives from several of the five plant biology categories (see B.S. program).

General Education
Required: Group 3, CHEM 403-404, General Chemistry
Recommended: Group 2, BIOL 528, Applied Biostatistics I
Group 8, PHIL 424, Science, Technology, & Society; and HUMA 651, Humanities and Science: The Nature of Scientific Creativity

Foreign Language
See University Academic Requirements.

General Science Certification

See pages 34 and 84.

Minors

The Department of Plant Biology participates in the interdisciplinary minor in plant pest management and offers two departmental minors: minor in plant biology and minor in environmental horticulture. These minors are available to all students and are designed to provide a flexible and broad selection of courses to complement any other major area of study.

The specific requirements of the minor in plant biology include PBIO 401, PBIO 412 or equivalent, and a minimum of 15 credits from the following list of courses: PBIO 566, 701/702, 625, 651, 668, 703, 709, 713, 714/715, 717, 719, 721, 722, 724, 727, 729, 744, 745, 747, 751, 752, 753, 758, 761, 764, 774/775, 795, 799.

The requirements for the environmental horticulture minor are PBIO 401, PBIO 421, and a minimum of 15 credits from the following list of courses: PBIO 547, 557, 565, 566, 572, 701/702, 612, 651, 652, 653, 655, 678, 682, 689, 706/708; HT 263.

For selection of specific courses, see the department chair or your adviser.

Departmental Honors

Honors in plant biology or environmental horticulture will be awarded to students who complete 16 credits of honors courses in plant biology courses (including a minimum of 4 credits in a senior honors thesis project), and maintain a minimum grade-point average of 3.20 (overall average and in major coursework). Students wishing to apply to the departmental honors program should consult with Garrett Crow.

Soil Science

(For descriptions of courses, see page 211.)

Soil scientists are concerned with proper management of our soil resources, in rural and urban environments, and with the essential role of soil in sustainable food and fiber production. Growing national attention to environmental concerns has also created a need for soil scientists as members of interdisciplinary teams engaged in a variety of natural resource issues.

Career opportunities are excellent for graduates of the soil science program. There is a growing awareness that planning, design, and construction of public and private facilities must be compatible with the soil upon which these facilities are placed. Thus, the increasing urbanization of the Northeast has created a demand for soil scientists competent to advise on soil considerations during planning and development stages. Soils expertise is usually needed in identification of sensitive areas in need of protection. Soil scientists often play important roles in toxic waste remediation, aquifer protection, and site selection for hazardous waste disposal or storage. There is also a growing role for soil scientists with supplemental training in environmental chemistry who wish to work with plant scientists and foresters in developing sustainable systems for food and fiber production, or with planners in developing landscape management plans.

Students in the soil science program are given a strong analytical background for studying physical, chemical, and biological properties of soils, as well as their classification and management. Graduates are well prepared for further study in graduate school, and professional certification is available through the American Registry of Certified Professionals in Soils.

Core Courses

A Soil Science Courses
SOIL 501, Introduction to Soil Sciences
PBIO 546, Plants, Soils, and Environment
SOIL 607, Soil and Land Evaluation
SOIL 609, Soils and Community Planning
SOIL 611, Soils and Environmental Quality
SOIL 702, Chemistry of Soils
SOIL 703, Chemical Analysis of Soil
SOIL 704, Soil Genesis and Classification
SOIL 705, Forest Soils

B. Natural Resources Courses
NR 401, Natural Resources Perspectives
FOR 527, Forest Ecology *or*
BIOL 541, General Ecology
NR 602, Natural Resources and Environmental Policy
WARM 716, Wetland Delineation
NR 775, Natural Resources Senior Project

C. *Support Courses*
PBIO 412, Introductory Botany
BIOL 528, Applied Biostatistics I
CHEM 403-404, General Chemistry
ESCI 512, Principles of Mineralogy *or* ESCI 561, Surficial Processes
EREC 411, Environmental and Resource Economics Perspectives
PHYS 401 (or 407), Introduction to Physics I
One course in chemistry beyond CHEM 403-404
One course in mathematics (MATH 420, 424B, or 425)
One writing course beyond ENGL 401 (ENGL 501, 503, or 519, DCE 596, or equivalent)

Students interested in the soil science major should consult with Christine Evans.

General Science Certification

See pages 34 and 84.

Tourism Planning and Development

(For descriptions of courses, see page 216.)

Tourism creates immense economic activity, totaling more than $4 trillion dollars of world spending activity. Tourism is also an integral part of New England's economy. Experience has shown that the public and private sectors of the tourism industry benefit substantially from proper planning. Those locations with the best planned and managed tourism developments are likely to be the most successful tourist destinations from the standpoint of providing both high-quality tourist experiences and bringing substantial economic benefits with minimal disruptions to the social and natural environment. In response to these needs, the Department of Resource Economics and Development offers a bachelor of science degree in tourism planning and development from regional and international perspectives.

The tourism planning and development curriculum provides students with the skills and knowledge necessary to plan, develop, and manage natural, cultural, and financial resources in an environmentally responsible manner. The program utilizes an interdisciplinary approach to provide students with a strong liberal education supplemented by a broad professional understanding of tourism planning and its role in local, state, national, global economic, and social development. Students study both the social and environmental sciences in order to better understand the complexity of natural and social systems. The program emphasizes the practical application of planning and economic theory to the planning for the development of tourism resources.

Curriculum Structure

Students entering the major may choose either: (1) the regional tourism planning emphasis, which includes the core course and electives to support interest in planning and community development, or (2) a concentration in international tourism development, which includes the core, language competency, and coursework centered on international affairs and experience.

Core Courses

All majors must complete a core curriculum of twelve courses. TOUR 400, Introduction to Tourism; EREC 411, Environmental and Resource Economics Perspectives; TOUR 439, Analyzing Community Systems; DCE 491, Computer/Information Systems Applications I (or equivalent); EREC 504, Business Management for Natural Resource Firms; MKTG 550, Survey of Marketing; SOC 601, Methods of Social Research; CD 614, Community Planning; TOUR 615, Tourism Planning and Development; TOUR 633, Economics of Travel and Tourism; and TOUR 700, Marketing Places. Class projects and a fourteen- to sixteen-week, full-time, supervised, professional internship (TOUR 794) enables students to meet and work in association with representatives from the public and private sectors of the tourism industry. All students must complete the internship and courses in a selected concentration area.

International Tourism Development Concentration

This concentration area prepares students to work in the dynamic and challenging environment of international tourism development. Depending on interests, language skills, and international experiences, students may expect to find employment in settings such as national tourism offices, international tourism organizations, national and foreign consults, and multinational tourism destination resorts. In addition to the required core courses, students who pursue the international tourism development concentration must complete the following departmental requirements: TOUR 705, Ecotourism; TOUR 792, International Experience; two TOUR electives; competency in a foreign language (i.e., functional reading, writing, and speaking ability equivalent to the third-year second-semester level); and two additional electives that will enhance students' career opportunities in the international area.

Regional Tourism Planning Concentration

This concentration area prepares students to obtain professional roles in planning in the public or private sectors of the tourism industry. Depending on interests and technical skills, students may expect to find employment in settings such as local and regional economic development organizations, chamber of commerce offices, convention and visitor bureaus, state and federal offices of tourism development, local and regional planning commissions, and resort communities. In addition to the required core courses, students who pursue the regional tourism planning concentration must complete the following departmental requirements: TOUR 767, Social Impact Assessment; TOUR 798, Independent Study in Tourism, Planning, and Development; two TOUR electives; and all requirements for a minor in community planning.

New England Regional Student Program

The B.S. in tourism planning and development program is one of the specialized curricula recognized by the New England Board of Higher Education and participates in the New England Regional Student Program. Under this program, students from the state of Rhode Island, Connecticut, Massachusetts, Vermont, and Maine receive some preferential admission consideration and, if admitted, pay the UNH in-state tuition rate plus 50 percent.

Water Resources Management

(For descriptions of courses, see page 217.)

There is a critical need for individuals who understand how changes in land use affect water quantity and quality. The B.S. degree program in water resources management is designed to educate students in the principles of land management, biology, chemistry, water quality, and hydrology specifically as they relate to the management of water resources. The program stresses an interdisciplinary approach to resource management, including environmental, economic, social, and political considerations. Hands-on field experience is expected and research projects are encouraged.

This degree program is designed for students who intend to pursue advanced degree work in environmental studies or careers in government, in public or private utilities that manage land and water resources, in private consulting firms that offer water resource management services, and in any of a wide variety of not-for-profit organizations that address land and water resource issues.

The program is divided into three interacting parts: general education, core requirements, and an area of specialization or exploration. The core program provides a foundation in both physical and social sciences. The area of specialization or exploration allows students to pursue a minor or double major, or to survey a variety of courses relevant to water resources management. This allows students to tailor their education to meet individual areas of interest.

In addition to formal courses, all water resources management majors are required to participate in a relevant work experience or internship (WARM 500) and a senior project (NR 775). Students are responsible for identifying appropriate work experiences, although assistance is available from the faculty. Students may also choose to do a senior thesis (WARM 795).

Students who are interested in the water resources management B.S. program should contact William H. McDowell in the Department of Natural Resources.

General Education	Credits
ENGL 401, writing skills	4
MATH 424B*, quantitative reasoning	4
BIOL 411*, science	4
CHEM 403-404*	8
Elective, historical perspectives	4
Elective, foreign culture	4
Elective, fine arts	4
EREC 411, social science elective	4
Works of literature, philosophy, and ideas	4
	40

Core Water Resources Management Degree Requirements	
One additional course in writing or public speaking	4
BIOL 528, Applied Biostatistics I	4
PHYS 401, Intro Physics I *or* PHYS 407, General Physics I	4
PHYS 402, Intro Physics II *or* PHYS 408, General Physics II	4
BIOL 412*, Principles of Biology II	4
BIOL 541, General Ecology	4
CS 401, Computer Applications or equivalent expertise	4
CD 614*, Community Planning	4
ESCI 401, Principles of Geology I	4
ESCI 705, Principles of Hydrology	4
EREC 676, Economics of Water Use and Quality Management	4
SOIL 501, Introduction to Soil Sciences	4
WARM 500, Work Experience	0
WARM 504, Freshwater Resources	4
WARM 603, Watershed Water Quality Management	4
WARM 700, Critical Analysis of Water Resources Literature	2
WARM 721, Ecology of Polluted Waters	4
NR 401, Natural Resources Perspectives	4
NR 602, Natural Resources and Environmental Policy	4
NR 775, Natural Resources Senior Project	2
	72

* Alternates available.

Each student must take a combination of courses, devised by the student and his or her adviser, that suitably defines a coherent area of professional specialization. Each student must accumulate a total of at least 128 credit hours.

Wildlife Management

(For descriptions of courses, see page 217.)

The wildlife curriculum is for students interested in the ecology, conservation, and management of wild animals. It is designed to provide a knowledge of wildlife species and their various forest, field, and wetland habitats. Students are prepared for employment with public and private agencies in wildlife management, or for continued study at the graduate level.

Fieldwork is carried out during the academic year on local and regional wildlife areas. Each year, a two-week field session is held during June for all students who have completed the sophomore year. Majors are assisted and encouraged to obtain summer employment related to their career objectives.

The degree earned is a bachelor of science with a major in wildlife management. The program is administered in the Department of Natural Resources.

In addition to the normal University fees and tuition, wildlife students are required to meet special fee charges in connection with regularly planned field laboratory sessions.

Freshman Year	Fall	Spring
BIOL 411, Principles of Biology I	4	—
BIOL 412, Principles of Biology II	—	4
ENGL 401, Freshman English	—	4
FOR 423, Dendrology	2	—
FOR 425, Field Identification of Trees and Shrubs	2	—
MATH 424B, Calculus for Life Sciences *or* MATH 420, Finite Mathematics	—	4
NR 401, Natural Resources Perspectives	4	—
WILD 433, Wildlife Ecology	4	—
Elective, physical science or General Education elective		4
Sophomore Year		
BIOL 528, Applied Biostatistics I	—	4
CHEM 403, General Chemistry	4	—
CHEM 404, General Chemistry	—	4
DCE 491, Computer/Information Systems Applications I	—	2
ENGL 501, Introduction to Prose Writing *or* ENGL 503 or 519	4	—
EREC 411, Environmental and Resource Economics Perspectives	—	4
FOR 527, Forest Ecology *or* BIOL 541, General Ecology	4	—
FOR 542, Forestland Measurement and Mapping (2-week summer course)	—	2
ZOOL 508, Human Physiology	—	4
Elective	—	4
Junior Year		
FOR 629, Silviculture or Equivalent	—	4
NR 602, Natural Resources and Environmental Policy	—	4
NR 709, Fire Ecology Seminar *or*	2	—
WILD 710, Endangered Special Seminar	—	2
WILD 615, Wildlife Habitats	4	—
WILD 655, Vertebrate Biology	4	—
WILD 737, Wildlife Population Dynamics	—	3
Elective	—	4
Elective	4	—
Elective	4	—
Senior Year		
NR 775, Natural Resources Senior Project	2	—
WILD 636, Wildlife Techniques	—	3
WILD 738, Wildlife Policy and Management	—	4
ZOOL 690, Evolution	4	—
ZOOL 712, Mammalogy or equivalent	4	—
Elective	4	—
Elective	—	4
Elective	—	4
Elective	—	4

*Electives should be used to satisfy remaining general education requirements and the wildlife major requirements in the areas of policy and administration, communication skills, and physical sciences (one course in each area—pertinent courses are listed in the detailed wildlife curricular guidelines available from the department).

Students interested in the wildlife management major may consult with the program coordinator, Peter Pekins, Pettee Hall.

General Science Certification

See pages 34 and 84.

Zoology

(For descriptions of courses, see page 219.)

The Department of Zoology has a primary responsibility for undergraduate and graduate instruction in fundamental aspects of animal biology, including the principles of form, function, development, and diversity produced by animal evolution. The teaching program provides a broad coverage of basic biological processes in invertebrate and vertebrate animals at the cellular, organismic, population, and community levels. Students receive background for a variety of professional positions in the public and private sector, and for graduate programs in the biological sciences including health-related fields. The department offers the bachelor of arts, bachelor of science, master of science, and doctor of philosophy degrees. Zoology faculty contribute significantly to the biology core curriculum, marine biology minor, genetics program, University Honors Program, Ocean Projects and Undergraduate Research Opportunity programs, and courses at the Shoals Marine Laboratory.

There is a strong teaching and research emphasis on ecological and physiological processes in aquatic animals or ecosystems. This focus is enhanced by the geographical location of the University and the availability of facilities for aquatic research. The University's location and facilities provide unique opportunities for the study of aquatic and terrestrial animals due to its access to the seacoast and the lakes region of New Hampshire, and the presence of two coastal marine laboratories, as well as estuarine and freshwater laboratories.

The zoology major builds from the common background of the biology core curriculum, with ample time for third- and fourth-year students to concentrate in specialized disciplines such as marine and freshwater biology, behavior, cell and developmental biology, ecology, evolution, fisheries, physiology, and neurobiology. Zoology majors must complete 32 credits from courses in the biological sciences approved by the department with a 2.00 average. Students must receive a minimum grade of C– in major requirements taught in the College of Life Sciences and Agriculture (e.g., zoology, microbiology, biology, biochemistry). A passing grade in major requirements taught outside the College of Life Sciences and Agriculture (e.g., chemistry, mathematics, physics) is acceptable. Minimum requirements for the zoology (B.S.) major are as follows: completion of the biology core courses and required courses in animal morphology, physiology and development, plus advanced electives in zoology and other biological sciences.

Students who are interested in a zoology major should consult the department's undergraduate adviser or chair.

General Science Certification

See pages 34 and 84.

Whittemore School of Business and Economics

Michael J. Merenda, Interim Dean
Stephen Fink, Associate Dean
JoAnn Kelly, Director of Undergraduate Programs
Gail Stepina, Academic Counselor

Department of Accounting and Finance
Department of Decision Sciences
Department of Economics
Department of Hospitality Management
Department of Management
Department of Marketing

Bachelor of Arts
Economics
- Financial and Managerial Economics
- International and Development Economics
- Public Policy Economics

Bachelor of Science
Business Administration
Hospitality Management
*Bachelor of Science-Master of Science in Accounting

*Pending Trustee approval.

The Whittemore School of Business and Economics prepares students for future careers in management, public service, research, and education. The liberal arts are the basic foundation of the curriculum, and management of change in a global community is the major emphasis. Each department and program has its unique disciplinary tradition and the simultaneous commitment to broad educational excellence in critical thought, verbal and written communications, quantitative skills, computer literacy, and ethical reasoning. International awareness and cross-cultural understanding are essential components of the educational experience of Whittemore School students. The educational process encourages the integration of practice and theory through student interaction with businesses, public agencies, and faculty research.

The Whittemore School's undergraduate curricula combine a breadth of liberal education with specifics of professional education in business administration, economics, and hospitality management. Undergraduates enrolled in the Whittemore School programs take a substantial part of their coursework in other colleges in the University in order to fulfill the general education requirements. Beyond those requirements, students are encouraged to elect additional courses in the arts, the behavioral and social sciences, the humanities, mathematics, and the natural sciences. Thus, students who complete the Whittemore School programs in business administration, economics, and hospitality management are prepared for employment and graduate study in both these and adjacent fields.

The Whittemore School offers a minor in business administration and in economics. Within the limits of its resources, the Whittemore School also serves the needs of undergraduates elsewhere in the University for whom selected courses in business administration, economics, or hospitality management are desirable complements to their primary course of study. To the extent that space is available after majors have enrolled, a limited number of Whittemore School courses are open to nonmajors who have the prerequisite preparation.

A maximum of 32 credits in courses offered by the Whittemore School of Business and Economics may be taken by non–Whittemore School students.

Degree Requirements

The Whittemore School offers a bachelor of arts degree program in economics and bachelor of science degree programs in business administration and hospitality management. Students who desire a professional career in public accounting are advised to follow the five-year program leading to a bachelor of science in business administration and a master of science in accounting degree (see page 96, Accounting Program of Study for details). Application for admission to this highly selective program is made in the junior year. Course listings for business administration are found under accounting and finance (ACFI), business administration (ADMN), decision sciences (DS), management (MGT), and marketing (MKTG). Candidates for a degree must satisfy all of the University general education requirements for graduation as well as the particular requirements of their individual major programs. In addition, candidates must complete a math course (400 level) and a computer applications course. Economics majors must also satisfy specific requirements associated with the bachelor of arts degree (see page 20). No Whittemore School course may be taken on a pass/fail basis by a student majoring in business administration, economics, or hospitality management.

Modifications tend to occur in major programs during the four-year period of a student's undergraduate career. Students are expected to conform to these changes. Students transferring into the Whittemore School from other universities must have business, economics, and hospitality management courses reviewed and approved by the Whittemore School Undergraduate Programs Office to be considered for major requirements.

For information concerning advanced degrees, see the Graduate School catalog.

Advising System

Undergraduate advising in the Whittemore School is carried out jointly by academic advisers and the faculty. The academic advisers are based in the Whittemore School Undergraduate Programs Office, where student academic records are kept. The advisers assist students in program planning, preregistration, understanding and meeting general academic requirements, and general academic and career decision making. In addition, the advisers coordinate study abroad, domestic exchange and honors programs, as well as the Washington Internship Program. The faculty draw on their own experience, expertise, and interests in helping students with course, program, and career selection.

The Peer Advising System, established in 1984, was created for the purpose of introducing freshmen to the college experience. Selected upperclass students provide a positive resource to guide freshmen. The program's goals are, through a mandatory yearlong program, to familiarize students with their major, college, and University; to support students in their personal growth; to develop personal responsibility; and to encourage freshmen to use the advising services on campus.

Undergraduates are encouraged to develop an advisory relationship with one or more faculty members with whom they have mutual interests. *All students are urged to seek as much assistance as they need, from whatever source, but are reminded that theirs is the ultimate responsibility for knowing and meeting the various academic requirements for a degree.*

Independent Study/Internship

Juniors or seniors in the Whittemore School may elect the internship or independent study options for variable credit. For either option, the student must secure a faculty sponsor in the area of interest and submit a written proposal prior to the start of the semester in which the project is to be undertaken. Independent study normally involves research, while internships are usually undertaken with cooperation of an off-campus organization and involve a nonroutine but practical application of skills and concepts acquired in a student's program.

Independent studies and internships require considerable self-direction and self-monitoring on the part of the student, who must be in high academic standing. Careful prior review of requirements with the undergraduate adviser is necessary. Students may earn no more than 16 credits in internships, independent studies, field experience, and supervised student teaching experience.

The Washington internship, a semester of supervised work experience in Washington, D.C., is open to any major. See page 209.

International and Exchange Programs

The Whittemore School encourages qualified students to participate in programs of international work and study. The Whittemore School has international exchanges including Grenoble, France, and Maastricht, the Netherlands.

Students may also elect to take a dual major in international affairs, offered in conjunction with the program for international perspectives (see page 101).

Information on all other international programs can be obtained from the sponsoring department or the Center for International Education, Hood House, Room 204.

Five-Year Programs:

Four-One Program: B.S.-M.S.A.

The American Institute of Certified Public Accountants (AICPA), the national association of professional accountants, has mandated that five years of university education be required for national Certified Public Accountant (CPA) certification by the year 2000. Most states have approved similar requirements for licensing/certification. The Whittemore School offers a five-year program designed for students who desire a professional accounting career. The program leads to the joint awarding of a bachelor of science in business administration and a master of science in accounting degree. Application for admission to this highly selective program is made in the junior year. Details are provided in the Programs of Study sections of the UNH undergraduate and graduate catalogs.

Three-Two Programs: B.A.-M.B.A., B.S.-M.B.A.

These programs are intended for nontraditional students with strong academic competence, maturity, and a number of years of work experience. The Whittemore School and the College of Engineering and Physical Sciences offer a joint program leading to a bachelor of science (B.S.) in chemical engineering, civil engineering, electrical engineering, or mechanical engineering and a master of business administration (M.B.A.) in five years rather than the normal six. Similarly, with the College of Liberal Arts, the Whittemore School offers a joint program leading to a B.A. in French, philosophy, or psychology and an M.B.A. The College of Life Sciences and Agriculture and the Whittemore School offer a joint program leading to a B.S. in plant biology and an M.B.A. See the individual college descriptions for details.

Programs of Study

Accounting and Finance

(For descriptions of courses, see page 119.)

Accounting and finance are fundamental academic disciplines in business schools. Accounting provides the basic language of business and the underlying structure for information systems. Finance provides important knowledge about asset management, capital markets, and risk strategies.

Many professional opportunities exist for students who elect an emphasis in accounting and/or finance. A finance emphasis prepares students for jobs in corporate financial management, investments management, banking, and governmental services. This emphasis helps students planning to sit for the Chartered Financial Analyst (CFA) Level I exam, the Certified Financial Manager (CFM) exam, and the Certified Financial Planner (CFP) exam. Students with a career emphasis in finance can choose three to six courses from the following

advanced courses: ACFI 701, Financial Policy; ACFI 702, Investments Analysis; ACFI 703, International Financial Management; ACFI 704, Derivative Securities and Markets; and ACFI 725, Financial Statement Analysis. Courses offering special topics in finance (ACFI 640; ACFI 720), internships (ACFI 751) and independent studies (ACFI 753) are also available.

An accounting emphasis prepares students for jobs in public accounting, industrial accounting, and governmental services, and gives a background for selected post-graduate studies such as law. The accounting emphasis also provides a background for students planning to sit for the Certified Public Accountant (CPA) exam, Certified Management Accountant (CMA) exam and the Certified Internal Auditor (CIA) exam. Students who desire a professional career in public accounting are advised to follow the five-year program detailed below in order to ensure their eligibility to sit for the CPA exam because of national and state-level 150-hour education requirements. Application for admission to this highly selective five-year program is made in the junior year.

B.S. - M.S.A. Program of Study

Bachelor's Courses (Years 1 & 2)

During their Freshman and Sophomore years, students enroll in Introductory Financial and Managerial Accounting, Microeconomics, Macroeconomics, Statistics and General Education Electives.

Bachelor's Courses (Year 3)

During their Junior year, students enroll in five of the six Group B courses currently required for the Business Administration major, plus Taxation and Management Strategy (ACFI 726), and Intermediate Financial Accounting I and II (ACFI 621 & 622).

	Fall	Spring
ACFI 601, Financial Management	4	—
ACFI 621, Intermediate Financial Accounting I	4	—
ACFI 622, Intermediate Financial Accounting II	—	
ACFI 762, Taxation and Management Strategy	—	4
DS 650, Operations Management	—	4
DS 670, Management Information	4	—
MGT 611, Behavior in Organizations	—	4

Bachelor's Courses (Year 4)

Students are expected to complete the following courses during their Senior year, including the remaining Group B required course (Quantitative methods) and the Group C required courses (Business, Government and Society, and Strategic Management. Decision Making).

	Fall	Spring
ACFI 723, Advanced Managerial Accounting Concepts and Applications	—	4
ACFI 724, Auditing	4	—
DS 630, Quantitative Methods	4	—
MGT 647, Business Law I	4	—
MGT 701, Business, Government, and Society	—	4
MGT 703, Strategic Management: Decision Making	—	4
Elective*	4	4

Master's Courses (Year 5)

At the satisfactory completion of courses from year 1-4, the students receive their Bachelor of Business Administration with a concentration in Accounting. Continuing students would be expected to complete the following courses during their Master's year:

	Fall	Spring
ACFI 850, Accounting Theory and Research	3	—
ACFI 844, Topics in Advanced Accounting	3	—
ACFI 849, Contemporary Issues in Financial Reporting	3	—
ACFI, 895, Governmental and Nonprofit Accounting	—	3
ACFI 897, Ethics and Professional Practices	—	3
ACFI 890, Acccounting Information Systems	—	3
Elective*	3	3
Elective*	3	—
ACFI 899, Masters Thesis	—	3

*Students are advised to enroll in appropriate level elective courses offered by the Whittemore School.

Business Administration

(For descriptions of courses, see Accounting and Finance, page 119; Business Administration, page 130; Decision Sciences, page 139; Management, page 179; and Marketing, page 180.)

The business administration program provides training for individuals interested in managerial or administrative careers in business or in public or private institutions.

Since most graduates of the program embark upon business careers, the program emphasis is in that direction. However, as demand has grown in recent years for people able to apply businesslike methods to the problems of not-for-profit institutions such as hospitals, school systems, government departments, and other socially oriented organizations, the program's objectives have been broadened to include all types of administration.

The curriculum offers professional education in the basic theories, principles, concepts, and analytical tools used by successful modern administrators, combining them with an introduction to some of the important functional areas of management. At the same time, typical students achieve a well-rounded education by selecting courses in the liberal arts and the sciences from other colleges and schools in the University.

The business administration program consists of thirteen required courses in three groupings, plus three required WSBE electives. In addition, the program requires completion of one semester of a 400-level math course and a computer applications course, which can be satisfied through coursework or acceptable equivalency. Group A includes the core courses taken in the freshman and sophomore years. These focus on basic concepts, tools, and skills. Group B consists of six courses in the functional areas of organizational behavior, operations management, marketing, finance, management information systems, and quantitative methods, normally taken in the junior and senior years. Group C consists of a course in business, government, and society; a "capstone" course in strategic management; and three electives. These electives must be chosen from upper-level (500 or above) Whittemore school courses and are taken in the junior and senior years. Courses that are taken on a pass/fail or credit/fail basis will not count as Group C electives.

Students must successfully complete all Group A courses (achieving a minimum grade-point average of 2.00 with no individual grade lower than C–) and obtain junior standing before any Group B courses may be taken; and all Group B courses must be completed before taking required Group C courses. In order to graduate, students must achieve a grade-point average of at least 2.30 in the sixteen major courses and a minimum grade of C– in each major course. Any WSBE major required course in which a grade below C- is obtained must be repeated. No more than two WSBE courses may be repeated and each course may be repeated one time. Students must make up the credits for a repeated course before graduating. Transfer credit can be applied only to Group A courses.

Students are encouraged to take advanced electives in areas of their interest and in relation to career goals. Faculty and the undergraduate advisers can provide useful information and guidance for choices of electives.

The Whittemore School also offers courses for nonmajors. Students interested in these courses should contact the undergraduate programs office.

The required plan of study is given below:

Freshman Year (Group A)
ECON 401, Principles of Economics (Macro); ECON 402, Principles of Economics (Micro); MATH 420, Finite Mathematics, or MATH 424A, Calculus for Social Sciences

Sophomore Year (Group A)
ACFI 502, Introductory Financial Accounting; ACFI 503, Managerial Accounting; DS 420, Business Statistics; CS 401, Computer Applications (or equivalent)

Junior and Senior Years (Group B)
ACFI 601, Financial Management; DS 670, Management Information Systems; DS 650, Operations Management; DS 630, Quantitative Methods; MGT 611, Behavior in Organizations; MKTG 651, Marketing

Senior Year (Group C)
MGT 701, Business, Government, and Society; MGT 703, Strategic Management. Decision Making; three WSBE electives

Minor

The Whittemore School faculty has developed a group of courses for nonmajors that, if available and when combined with certain elective courses, can constitute a minor in business administration. A list of minor requirements is available in the Whittemore School Undergraduate Programs Office, Room 120, McConnell Hall.

Decision Sciences

(For descriptions of courses, see page 139.)

The Decision Sciences Department brings together faculty with special expertise in business statistics, decision support systems, management information systems, management science, production/operations management, operations research, and manufacturing strategy. The department contributes to the general education of all students in the Whittemore School through the development and teaching of required and elective courses. The department's faculty serve the school and the University through teaching excellence, active scholarship, and involvement with the business and professional community within the state and beyond.

Beyond the core courses students may elect any of three emphases within the department. For an operations management emphasis, students take DS 754, Resource Management; DS 755, Manufacturing Management; DS 758, Strategic Management of Operations; and DS 765, Total Quality Management. These courses help prepare students to sit for the American Production and Inventory Control Society (APICS) certification exams. For a management science/statistics emphasis, students take DS 626, Applied Regression Analysis; DS 633, Advanced Operations Research; and choose from DS 522, Advanced Business Statistics; DS 624, Time Series Forecasting; and DS 625, Statistical Decision Making. For a management information systems emphasis, students take DS 672, Computer Systems Analysis and Design; and DS 772, Decision-Support Systems. Students may also take DS 698 or DS 798, Topics in Decision Sciences.

Economics

(For descriptions of courses, see page 144.)

Economics is the study of how societies organize themselves to produce goods and services and to distribute those products among the members of society. In the modern world, a combination of market forces, public policies, and social customs perform these basic economic tasks. Economists use concepts, models, and data to analyze efficiency of resource use, fairness of economic outcomes, and development of global and national economies. The economics program is designed to introduce students to the tools of economic analysis and to show students how they can use those tools to analyze and better understand real-world situations.

Undergraduate training in economics is an excellent background for a variety of careers; these include banking and financial services, journalism, international business, public service, the diplomatic corps, entrepreneurial ventures, and government administration. An undergraduate major in economics is also excellent preparation for those interested in graduate work in law, business administration, and international relations.

Graduate work in economics can lead to careers in college teaching, research in public and private agencies, and business consulting. Those interested in studying economics at the graduate level should ask their economics professors what undergraduate coursework is appropriate and which graduate schools would be suitable.

Courses in economics are open to nonmajors on a space-available basis. Students majoring in other programs have found that certain economics courses are useful supplements to their own majors and a help in gaining employment. For example, political science majors can profit from studying public economics, economic development, and international economics. Mathematics and engineering students might elect to study econometrics and intermediate microeconomics. Environmental conservation majors could choose to study ecological or energy economics. For more information on economics electives, please consult the Whittemore School Undergraduate Programs Office (McConnell 120) or the chairperson of the economics department.

Economics majors must complete eight courses in economics plus DS 420 with a grade of at least C– (1.67) in each course and an average grade of C or better. These courses must include ECON 605 and 611. In addition, majors must complete CS 401 and either MATH 420 or 424A. Coursework in accounting is recommended but not required.

Major credit toward ECON 605 and/or 611 will be awarded to transfer students only if equivalent courses have been taken at the junior level or above. Transfer students must take at least five of their economics courses at UNH.

Students may petition to substitute one business administration course for an economics elective if the course is at the 600 level or above and if a grade of C– or better is earned. Students may earn no more than 16 credits in internships, independent studies, field experience, and supervised student teaching experience. All economics majors must satisfy the bachelor of arts degree requirements (page 20).

The economics department offers three specialized options within the major. By selecting economics electives from an approved list, a student majoring in economics can graduate with an option in financial and managerial economics, international and development economics, or public policy economics.

A suggested plan of study for economics majors follows:

Freshman Year
ECON 401, 402, Principles of Economics (Macro and Micro); MATH 420 or MATH 424A

Sophomore Year
DS 420, Business Statistics; ECON 605, Intermediate Microeconomic Analysis; ECON 611, Intermediate Macroeconomic Analysis; CS401, Computer Applications (or equivalent)

Junior and Senior Years
Economics electives (at least 4)

A minor in economics consisting of five courses is also available. At least three of these courses must be taken at UNH. For more on the minor and options within the major, consult the Whittemore School Undergraduate Programs Office.

Hospitality Management

(For descriptions of courses, see page 170.)
The program in Hospitality Management is an integral part of the offerings of the Whittemore School. It is one of only four programs worldwide that is accredited by both the American Assembly of Colleges and Schools of Business-AACSB and the Accreditation Commission for Programs in Hospitality Administration-ACPHA. Graduates are prepared to assume management positions in all sectors of the service sector, with primary emphasis on the hospitality industry.

Graduates have accepted positions in lodging and food service (and their allied businesses and wholesalers), retirement facilities, software companies, tourism, travel and recreation industries, and institutions such as hospitals, nursing homes, colleges, and schools.

In order to have a well-rounded university education, students take courses in liberal arts as well as foundation courses in business administration and economics. The hospitality management curriculum builds upon this foundation and provides experience and in-depth education in the lodging and food service-related industries, as well as the broader industries that comprise the hospitality discipline. Each course includes an international component.

With our on-campus learning laboratory, the New England Center Hotel and Conference Center, the program includes a mix of practical experiences along with classroom activities. These practical experiences are provided by major consulting projects to industry as part of classroom activities, lecture series, seminars, and field trips; a minimum of 400 hours approved work experience or practicum; and by involvement in the food service and lodging operations at the New England Center.

The Department of Hospitality Management encompasses eighteen required courses and four hospitality electives in three groupings. Group A consists of eight core courses taken in the freshman and sophomore years. Group B includes most of the functional hospitality and business disciplines required to develop into a successful manager. A wide range of elective courses, independent studies, and internships can complement the required curriculum. In addition, the program requires completion of one semester of a 400-level math course and a computer application course, which can be satisfied through coursework or acceptable equivalency.

Students must successfully complete Group A courses, achieving a minimum grade-point average of at least 2.00, before Group B courses may be taken. Group B courses must be completed before taking any Group C courses.

To graduate, students must obtain a 2.30 grade-point average in all major required courses and a minimum grade of C– in each major course. Graduates of this program who are qualified for, and interested in further allied studies, are well prepared for advanced degree programs in hospitality, tourism, business, institutional, or health administration. Students may earn up to 12 total credits in internships, independent studies, field experience, and supervised student teaching experiences.

A required plan of study is given below.

Freshman Year
(* denotes Group A courses)
HMGT 401, The Hospitality Industry: An Historical Perspective and Distinguished Lecture Series*
HMGT 403, Intro. to Food and Beverage Management*
ECON 401, Principles of Economics (Macro) and ECON 402, Principles of Economics (Micro)*
ENGL 401, Freshman English
MATH 420, Finite Mathematics, or 424A, Calculus for Social Sciences
2 University general education courses

Sophomore Year
(* denotes Group A courses)
HMGT 554, Lodging Operations Management* or
HMGT 567, Food and Beverage Operations Management*
ACFI 502, Introductory Financial Accounting*
ACFI 503, Managerial Accounting*
DS 420, Business Statistics*
Computer applications
3 University general education courses

Junior Year (Group B)
HMGT 600, Hospitality Marketing Management
HMGT 603, Service Industries Management
HMGT 618, Uniform Systems for the Hospitality Industry
HMGT 635, Hospitality Human Resource Management
MGT 611, Behavior in Organizations
3 hospitality, business, or University general education courses

Senior Year (Group C)
HMGT 625, Hospitality Law (Group B)
HMGT 627, Employment Law
HMGT 655, Hospitality Finance and Development
HMGT 703, Strategic Management in the Hospitality Industry
5 hospitality, business, or University general education courses

Management

(For descriptions of courses, see page 179.)
The study of management focuses on how organization members develop and use strategies, structures, and the accompanying social, political, economic, and technical processes needed to compete in national and global markets. Courses cover such topics as leadership, ethics, adaptation, innovation, organizational learning and change, human resource management, governmental policy making, and industrial economics. The department's approach to teaching involves educational methods that promote behavioral and analytic competence through experiential learning, self-awareness, theoretical mastery, and case studies. A major emphasis is on action learning through group projects.

In addition to the required core course (MGT 611, Behavior in Organizations) and the capstone senior-year courses (MGT 701, Business, Government, and Society; and MGT 703, Strategic Management), students may choose from a variety of electives including MGT 614, Organizational Analysis; MGT 647-648, Business Law I & II; MGT 712, Managing Change and Conflict in Organizations; MGT 713, Management Skills; MGT 732, Exploration in Entrepreneurial Management; MGT 745, International Business; MGT 755, International Management; MGT 770, Strategic Human Resource Management; and MGT 785, Career Management. Courses offering special topics are also available, e.g., total quality management, management consulting, and group dynamics/team leadership.

Marketing

(For descriptions of courses, see page 180.)

The marketing curriculum is designed to help students explore the exchange process between a business or institution and its customers or memberships. A marketing exchange occurs when a person gives up something he or she values (e.g., money, time, or effort) for something he or she wants or needs from the business or institution (e.g., goods or services). Marketing is the function in the organization which is responsible for determining what those needs and wants are, how they might be met, and how to communicate with prospective customers about how the organization can meet their needs.

Careers for students interested in marketing include jobs in marketing and product management, sales, advertising, retailing, and marketing research. Opportunities exist in consumer and industrial products at all levels of the marketing channel from manufacturer to wholesaler to retailer; for goods as well as services; and within for-profit and not-for-profit organizations.

Students interested in careers in marketing should select electives related to their career interests. The Undergraduate Programs Office and the marketing faculty can help students select appropriate electives and provide information on marketing careers.

All electives require successful completion of MKTG 651, Principles of Marketing.

Contact the Undergraduate Programs Office or the Department of Marketing for an up-to-date listing of course offerings.

Special University Programs

Interdisciplinary Programs
Earth, Oceans, and Space
Gerontology
Health Promotion
Intercollege Courses
International Affairs
Marine Sciences
Race, Culture, and Power
Student-Designed Majors
Technology, Society, and Values
War and Peace Studies

Preprofessional Programs
Prelaw
Premedical/Predental Study

Off-Campus Programs
UNH/UNHM Cross Registration
Consortium (NHCUC) Student Exchange Program
New England Subdegree Exchange Program
Exchange Programs within the U.S.

Study Abroad Programs

Other Programs
Honors Program
Reserve Officer Training Corps Programs
Undergraduate Research Opportunities Program

In addition to programs listed above, the following interdisciplinary programs may be found under their separate colleges and schools.
African American studies minor, page 26
American studies minor, page 27
Asian studies minor, page 28
Biology, page 83
Community development, pege 84
Dual degrees, page 21
Environmental and resource economics, page 85
Environmental conservation, page 86
Environmental engineering minor, page 51
Five-year B.A.–M.B.A. program, page 38, 44, 46, 95
Five-year B.A.–M.ed. program, page 34
Five-year B.S.–M.B.A. program, page 95
Five-year B.S.–M.ed. program, page 34
Five-year B.S.–M.S.A. program, page 95
General studies, page 88
Genetics minor, page 79
History and philosophy of science minor, page 28
Humanities major and minor, pages 29 and 40
Hydrology, pages 51 and 60
Independent study and projects in the College of Engineering and Physical Sciences, page 52
Interdisciplinary mathematics (5 options), page 64
Justice studies minor, page 29
Latin American studies minor, page 30
Linguistics major, page 41
Materials science minor, page 52
Nutritional sciences, page 89
Plant pest management, page 80
Religious studies minor, page 30
Second majors, page 21
Soil science, page 90
Student-designed majors, page 103
Wildlife management, page 92
Women's studies major and minor, pages 30 and 49

This section describes interdisciplinary study opportunities; preprofessional programs (prelaw, premed/prehealth); off-campus, foreign study, and exchange programs; and other special academic programs at UNH.

Interdisciplinary Programs

Earth, Oceans, and Space

The Institute for the Study of Earth, Oceans, and Space (EOS) is devoted to obtaining a scientific understanding of the entire Earth system and its environment in space. EOS research analyzes on global and finer scales the interactions and processes controlling the Earth system's components: the atmosphere, magnetosphere, biosphere (including anthrosphere), hydrosphere, cryosphere, lithosphere, the Sun, and the space environment.

The institute brings together under a common theme several established research groups on campus: the Space Science Center, the Biogeochemical Systems Center, the Climate Change Research Center, the Complex Systems Research Center, and the Ocean Process Analysis Laboratory. Although the primary educational theme of the institute is to expand upon existing graduate degree programs to train future scientists with a global view, undergraduate courses to stimulate and excite advanced students with the Earth system perspectives are offered.

Gerontology

The gerontology interdisciplinary minor provides students with the opportunity to examine and evaluate the aging process as it affects the individual and society. Through in-depth inquiry, personal encounters, and classroom discussion, students develop an understanding of aging from a variety of perspectives. Students are encouraged to analyze the historical and philosophical foundations from which policies, programs, and professional activities affecting the aged are developed, implemented, and evaluated.

Gerontology minors are required to take a minimum of 20 credits (five courses). The courses must include three core gerontology courses plus two electives from a list of courses approved by the Gerontology Interdisciplinary Minor Advisory Committee.

Required Core Courses
GERO 600, Introduction to Gerontology
NURS 670, Issues in Health Care of the Aged
GERO 795, Independent Study (a practicum arranged by the coordinator of the minor, or by the appropriate designee)

Approved Electives
FS 525, Human Development
HMP 755, Aging and Long-Term Care Policy
KIN 607, Biology of Aging
NURS 535, Death and Dying
NUTR 760, Geriatric Nutrition
OT 501, Developmental Tasks of Adulthood
PSYC 582, Adult Development and Aging
PSYC 741, Cognitive Aging
SW 525, Introduction to Social Welfare Policy
SW 550, Human Behavior and Social Environment I
SW 700, Social Gerontology
SW 701, Women and Aging
SOC 720, Current Developments in the Family: Aging and Late-Life Family

Other courses on special topics may complete the electives if approval is obtained from the advisory committee.

Students who wish to minor in gerontology should consult with Elizabeth Crepeau, Department of Occupational Therapy, Hewitt Hall, (603) 862-3420. The director of the Interdisciplinary Program on Aging is Raelene Shippee-Rice, Department of Nursing, Hewitt Hall, (603) 862-4715.

Health Promotion

The health promotion minor introduces

students to concepts of health and health promotion with a focus on personal lifestyle, community structure, economic structure, and social organization. The program relies on such fields as health education, kinesiology, recreation management, sociology, psychology, epidemiology, public health, and community analysis. Thus, the minor is a valuable asset for students in various fields.

The health promotion minor consists of 20 credits of approved coursework, including three core courses and two electives from a list of approved courses. An advisory committee, chaired by a School of Health and Human Services faculty member, oversees the program. Students who wish to minor in health promotion should consult with the dean's office, School of Health and Human Services, Hewitt Hall, Room 217, (603) 862-1177.

Required Core Courses
HMP 401, U.S. Health Care Systems
HP 540, Life Style, Human Behavior, and Health
HP 740, Health Promotion Seminar

Elective Courses
EC 684, Sustainable Living
EC 795, Investigations in Environmental Conservation
FS 746, Human Sexuality
GERO 600, Introduction to Gerontology *or* NURS 670, Issues in Health Care of the Aged
HMP 501, Epidemiology and Community Medicine
INCO 404C, Health and Human Disease
MICR 501, Public Health Microbiology
NURS 595, Women's Health
NUTR 400, Introduction to Nutrition *or* ANSC 400, Food and People
NUTR 620, Community Nutrition *or* NUTR 720, Public Health Nutrition
PHIL 660, Law, Medicine, and Morals
PSYC 552, Social Psychology
HHS 510 *or* INCO 404S, AIDS: Health, Ethics, and Social Agenda
HHS 798K, Peer Education
SW 6978, Drug and Chemical Dependency

Intercollege Courses

Intercollege courses are listed on page 172. INCO courses include INCO 401, War; INCO 402, Peace; INCO 404, Honors: Freshman Seminar; INCO 450, Introduction to Race, Culture, and Power; INCO 480, Art in Society; INCO 585, 586, Foreign Exchange; INCO 604, Honors: Senior Thesis/Project; INCO 655-656, London Program; INCO 685, 686, Study Abroad; and INCO 698, Summer Research Project, and others.

International Affairs

(For descriptions of courses, see page 173.)
The Center for International Education offers undergraduate students the opportunity to pursue a dual major in international affairs. The dual major requires completion of the interdisciplinary international affairs program and any other major.

The purpose of the program is to expand students' global horizons, enhance their disciplinary major, and expand their career opportunities into the international arena. The requirements for international affairs are listed below.

Required Core Courses
IA 401, International Perspectives: Science, Business, and Politics
IA 501, Global Issues in International Affairs
IA 701, Seminar in International Affairs

Four Electives
(one from each of the program's four elective groups)
Foreign area
Science, technology, and the private sector
Public policy
Theory in international affairs

Competency in a Foreign Language
Functional reading, writing, and speaking ability equivalent to the third-year, second-semester level

Foreign Experience
A minimum of eight weeks in a non–English-speaking country

The courses in the dual major program are multidisciplinary, taught by faculty from many different departments in the University. They are designed to help students appreciate the complex interrelationships and interdependencies among nations and peoples and to equip students with the analytical skills and broad perspectives necessary for both public- and private-sector international careers.

Students who wish to declare international affairs must earn a *C or better in IA 401*, have declared (or be prepared to declare) a disciplinary major, and have a *2.50 cumulative grade-point average*. After declaration, students are expected to maintain at least a 2.50 grade-point average, which is the minimum required for study abroad at UNH.

IA 401, a prerequisite for IA 501, should be taken during the fall of the freshman or sophomore year, and IA 501 no later than spring of the sophomore year.

The foreign experience (usually completed during the junior year) and the foreign language requirement are completed before taking IA 701 in the spring of the senior year. To acquire the knowledge, skills, and experience that come from residence in a foreign culture, students may spend an academic year, semester, or summer in an academic institution, in an internship with a private or public organization, or in purposeful travel.

The completion of the dual major requires no additional credits for graduation beyond the 128 required of all UNH students. All coursework required for international affairs must be completed with a *grade of C or better*. For information, contact the Center for International Education, Hood House, (603) 862-2398.

Marine Sciences

Undergraduate programs in marine science and ocean engineering at the University of New Hampshire reflect the diversity of the ocean itself and are enriched by easy access to a variety of natural laboratories, including tidal rivers, estuaries, coastal areas, and the open ocean.

Studies in marine science and ocean engineering are offered through various departments of the University. Students identify the discipline (ranging from zoology through earth sciences to mechanical engineering) they like best and pursue marine specializations related to that area of study. Studies can take place in research laboratories on campus as well as at various field stations or aboard UNH research vessels.

Marine Program

The Marine Program provides a campuswide umbrella for marine activities and maintains specialized facilities to support efforts of faculty in individual departments and organized research units. The Center for Marine Biology, the Center for Ocean Sciences and the Center for Ocean Engineering—the Marine Program's three major components—provide education and research activities in their particular areas.

Estuarine research is pursued at the Jackson Estuarine Laboratory on Great Bay, which is designated a National Estuarine Research Reserve. The Coastal Marine Laboratory, a major running-seawater facility, is located in nearby New Castle. Research on salmonids and other freshwater animals is conducted at the Anadromous

Fish and Aquatic Invertebrate Research Laboratory, located near the Durham reservoir. The Institute for the Study of Earth, Oceans, and Space is a major center for ocean sciences research. The on-campus Chase Ocean Engineering Laboratory houses both educational and research activities. Off-shore and coastal studies are carried out aboard the University's 50-foot research vessel, the *Gulf Challenger*, which has docking facilities at the Jackson Lab and at the State Fish Pier in Portsmouth Harbor. During the summer, students may live and study at the Shoals Marine Laboratory on Appledore Island, one of the Isles of Shoals. There UNH and Cornell University cooperatively offer undergraduate courses in marine sciences in a summer field laboratory setting. Each of the marine program facilities features modern specialized equipment, including navigational and sampling aids aboard the research vessel.

Curricula in the Marine Sciences

There are currently one undergraduate major and three minors in the marine sciences. The College of Life Sciences and Agriculture offers a major in biology with an option in marine and freshwater biology (see biology under COLSA). Alternatively, students can declare a major in an established science discipline (e.g., zoology, plant biology or microbiology) and augment it with a minor in marine biology, ocean engineering, or oceanography.

Marine Biology Minor

The minor in marine biology, available to all students in the University, consists of 20 credits with grades of C– or better and no pass/fail courses. No more than 8 major requirement credits may be used. All courses in the program are selected in consultation with a minor adviser. Contact Larry Harris, Department of Zoology, for more information.

Students who want to minor in marine biology must take one introductory course (ESCI 501, Introduction to Oceanography; ZOOL/PBIO 503, Introduction to Marine Biology; or ZOOL 674, Field Marine Science) and four courses concentrating on an area of interest. For example, a student interested in marine mammals might take Mammalogy (ZOOL 712), Marine Invertebrate Evolution and Ecology (ZOOL 628), Marine Vertebrates (ZOOL 753), and Fisheries Biology (ZOOL 772). Courses commonly taken as part of the minor include PBIO 625, 721, 722, 725; CIE 747; MICR 714, 707; ZOOL/PBIO 503; ZOOL 628, 674, 751, 753, 772, 775. In addition, students are encouraged to become involved in a research project, either by working in a professor's laboratory or by participating in the Undergraduate Ocean Research Program (TECH 797).

Students should declare their intention to minor in marine biology before the end of the junior year. During the final term, students should apply to the dean to have the minor shown on their transcript.

Ocean Engineering Minor

The ocean engineering minor allows undergraduate engineering students to acquire a nucleus of knowledge about engineering pertaining to the ocean and the coastal zone.

To meet the University minor requirement, students must satisfactorily complete a minimum of five courses from the following list: ESCI 501, Introduction to Oceanography; OE 690, Introduction to Ocean Engineering; ESCI 752, Chemical Oceanography; ESCI 758, Introductory Physical Oceanography; ESCI 759, Geological Oceanography; OE 710, Ocean Measurements Lab; OE 744, Corrosion; OE 753, Ocean Hydrodynamics; OE 754, Ocean Waves and Tides; OE 756, Principles of Naval Architecture and Model Testing; OE 781, Physical Instrumentation; OE 785, Underwater Acoustics; OE 795, Special Topics in Ocean Engineering; CIE 747, Introduction to Marine Pollution and Control; OE 757, Coastal Engineering and Processes; and TECH 797, Undergraduate Ocean Research Program. Ordinarily, students typically take ESCI 501, TECH 797, and OE 690 plus two additional engineering courses from the above list to complete the minor.

Students wishing to take the ocean engineering minor should indicate their interest to the ocean engineering minor adviser, Kenneth C. Baldwin, Department of Mechanical Engineering, no later than the beginning of the junior year. During the final semester, students must apply to the dean to have the minor shown on their transcript.

Oceanography Minor

The minor in oceanography, available to all students in the University through the Department of Earth Sciences, consists of a minimum of five courses with grades of C (2.00) or better and no pass/fail courses. No more than 8 major requirement credits may be used. All courses in the program are selected in consultation with the oceanography minor adviser, T. C. Loder, in the Department of Earth Sciences.

Required courses include (1) ESCI 501, Introduction to Oceanography; (2) two of the following courses: ESCI 750, Biological Oceanography; ESCI 752, Chemical Oceanography; ESCI 758, Introductory Physical Oceanography; ESCI 759, Geological Oceanography; (3) any two of the following courses, or a suitable substitute approved by the minor adviser (at least one of these courses should be in the biological sciences): PBIO 625, 722; CIE 747, 757; ESCI 653, 658, 754, 756; EOS 754; MICR 707; OE 690, 710, 751, 752, 753, 754, 757, 785; EREC 611; TECH 797; ZOOL 503, 560, 674, 720, 725, 730, 751, 753, 772, 775; ZOOL/ESCI 750.

Students are encouraged to declare their intention to minor in oceanography before the end of the junior year. During the final semester, students should apply to the dean to have the minor shown on their transcript.

Shoals Marine Laboratory

The University of New Hampshire, in cooperation with Cornell University, offers a summer field program in marine sciences on Appledore Island of the Isles of Shoals. Undergraduate courses introduce students to a broad array of marine sciences, including oceanography, marine biology, fisheries, and marine resources. Introduction to Field Marine Science (ZOOL 474), a three-week, 4-credit course, is offered every other summer at the Shoals Marine Lab. It has no prerequisites and satisfies the general education requirement in the biological sciences. The four-week, 6-credit general courses, Field Marine Science (ZOOL 674) and Field Marine Ecology (ZOOL 675), are offered in June and August, respectively, each summer. They draw upon the backgrounds of numerous faculty and others associated with marine science and fisheries. There are daily lectures and work in laboratory and field. The courses are graded on a letter- grade basis; at least one full year of college biology or the equivalent is a prerequisite.

Other credit courses are offered in marine botany, invertebrate zoology, experimental ecology, ornithology, animal behavior, fish ecology, coastal ecology and bioclimatology, wetlands, marine vertebrates, coastal policy, underwater research, and biological illustration.

Undergraduate research for credit is an option where students carry out part or all of an independent project at Shoals

under the guidance of Shoals faculty. Shoals offers generous financial aid to UNH students outside of the normal UNH financial aid packages. For further information, contact C. Sarah Cohen at (603) 862-1023.

Diving Program

The UNH diving program offers instruction in scuba diving and research diving techniques. It also provides professional diving support for underwater research. The Shoals Marine Laboratory offers courses in marine archaeology and underwater research during the summer, under the guidelines of UNH diving regulations. For further information, contact Paul Lavoie, diving safety officer, through the Marine Program Office in the Jere A. Chase Ocean Engineering Laboratory.

Marine Research

There are many opportunities for undergraduates to participate in marine research under the supervision of UNH faculty.

The University of New Hampshire and the University of Maine at Orono have a joint Sea Grant College Program that supports research, teaching, and service projects through funding from the National Oceanic and Atmospheric Administration of the Department of Commerce. Marine research projects also receive support through the National Science Foundation, the Department of the Interior, the Office of Naval Research, and other foundations and private donors.

Extensive research, interdisciplinary academic programs, and the extraordinary variety of marine environments and facilities allow students to observe and learn about the frontiers of science and technology being explored in the ocean. For further information about marine opportunities, contact the Marine Program Office in the Jere A. Chase Ocean Engineering Laboratory.

Race, Culture, and Power

The minor in race, culture, and power offers a wide variety of opportunities to study the historical, psychological, social, and economic implications of race and culture in the United States and in the world. It prepares students to live and work in the twenty-first century where race is a continuing cultural experience. The goal of the minor is to offer productive ways of addressing racial and cultural differences. Courses for the minor are designed to enable students to develop critical perspectives on the function of racial and cultural difference in the constitution of social power.

To complete the minor, students are required to take an introductory course (INCO 450) and then 16 credits of electives. Students must earn a C– or better in each course, and maintain a 2.00 grade-point average taken for the minor. Ordinarily, no more than two electives may be taken from the same academic department. A relevant internship may be substituted for one of the electives. Electives may include a senior seminar.

A partial list of acceptable electives follows.

INCO 450, Introduction to Race, Culture, and Power
AOE 630, Development of Food and Fiber in the Third-World
AMST 502/ENGL 517, Introduction to African American Literature and Culture
ANTH 500, Peoples and Cultures of the World
ANTH 520, Anthropology of Migration
CMN 515, Analysis of News
CMN 567, Images of Gender in the News
EC 535, Contemporary Conservation Issues
ECON 668, Economic Development
EDUC 797, Seminar in Contemporary Educational Problems
ENGL 517, Introduction to African American Literature and Culture
ENGL 739, American Indian Literature
ENGL 750, Special Studies in American Literature
FS 757, Race, Class, Gender and Families
GEOG 402, Regional Geography of the Non–Western World
GERM 624, Special Topics in German Cultural Studies
HIST 405, History of Early America
HIST 505, African American History
HIST 507, Native Peoples of the Americas
HIST 509, Law in American Life
HIST 588, History of Africa South of the Sahara
HIST 603, The European Conquest of America
HIST 609, American Legal History
HIST 631, History of Brazil
HIST 684, History of Southern Africa since 1820
POLT 513, Civil Rights and Liberties
POLT 620, Multicultural Theory
POLT 797, Feminist Political Theory
SOC 530, Race and Ethnic Relations
SOC 645, Class, Status and Power
SOC 697, Work and Workers Rights in a Changing Society
SW 525, Introduction to Social Welfare Policy
SW 551, Human Behavior and Social Environment II
SPAN 622, Spanish Civilization and Culture
SPAN 798, Latin American and Brazilian Literature in Translation
WS 732, Feminist Thought
WS 798, Special Topics in Women's Studies

For more information and to be assigned an adviser for the race, culture, and power minor, contact a co-coordinator: Nina Glick Schiller, Department of Anthropology, (603) 862-1864, Huddleston 310, or the office of the minor at (603) 862-3753, Huddleston 336.

Student-Designed Majors

Under special circumstances, students may design their own majors. This option is offered for highly motivated and self-disciplined students who seek a course of study that is not available through existing programs at the University. It allows students, with the close supervision of faculty members, to cross department and college lines and to create educational experiences on and off campus as part of individual programs of study.

Student-designed majors are administered by a committee of elected faculty that operates through the Office of the Provost and Vice President for Academic Affairs. Students who want to design their own majors are expected to give the committee evidence of careful thought and planning in a detailed proposal submitted before the middle of their junior year. Proposal guidelines are available in the Office of the Provost and Vice President for Academic Affairs.

Technology, Society, and Values

The technology, society, and values (TSV) minor integrates studies of modern technology, its social and environmental impact, and its ethical implications. It allows students in technological majors to understand their disciplines in a broader context, and those in nontechnological majors to become better informed about technology and its effects. It provides courses which illuminate technological achievements and dilemmas spawned by technology, arranges public programs at which policy and ethical issues on technology are addressed, and seeks career contacts for students in fields that cut across liberal arts and technological topics.

The student minoring in TSV completes a minimum of 20 credits of TSV courses. All students in the minor must take PHIL 424, Science, Technology, and Society. TECH 583, Technology: Cultural Aspects is required of all non-engineering students. Other students may petition out of the TECH 583 requirement with the approval of the TSV coordinator.

The remaining courses to constitute the minor are selected from the following list. (In Fall 1999 a slightly revised list will be available to reflect changes in the curriculum.)

CHE 410, Survey of Current Energy and Pollution Control Technology
ENCV 520, Environmental Pollution and Protection-A Global Context
CMN 455, Introduction to Mass Communication
CMN 647, Rhetoric of Science
EC 501, Environmental Philosophy
EC 535, Contemporary Conservation Issues
ENGL 521, The Nature Writers
HMP 401, U.S. Health Care Systems
HIST 521, The Origins of Modern Science
HIST 522, Science in the Modern Period
HIST 523, Introduction to the History of Science
HIST 654, Topics in the History of Science
INCO 401, War
NURS 670, Issues in Health Care of the Aged
PHIL 424, Science, Technology, and Society
PHIL 450, Ecology and Values
PHIL 447, Computer Power and Human Reason
PHIL 630, Philosophy of the Natural Sciences
PHIL 660, Law, Medicine, and Morals
TECH 583, Technology: Cultural Aspects
TOUR 767, Social Impact Assessment

The student normally may apply up to 4 credits within his or her major, and at most 8 credits within any one department, toward the TSV minor.

Students interested in minoring in TSV should contact the TSV director, George Romoser, in the TSV Office, 334 Huddleston Hall, (603) 862-1778, fax (603) 862-1131.

War and Peace Studies

War is the scourge of humankind. Tribes, cities, and nations have gone to war against each other for as long as we have record; only here and there, among some small "precivilized" groups, has war been absent or strictly controlled. For as long as we have record, too, we find thoughtful people crying out against war and pleading for peace, arguing for principles to govern war's conduct and laboring to mitigate war's effects, imagining a world where war is abolished, and taking steps to bring that world about. As the scale of war has grown to a size now great enough to devastate the entire globe in a single conflict, more and more people have devoted themselves to preventing war and finding acceptable substitutes. In the nuclear era, age-old moral and religious discussion has joined with historical study and practical, even technical, research to produce a set of related disciplines sometimes called "war and peace studies."

To meet the requirements for the war and peace studies minor, students must complete two core courses (8 credits) and 12 credits of elective courses with a grade of C– or better. At least one core course must be completed before any elective can be counted toward the minor. Ordinarily no two electives (or no more than 4 credits) may be taken from the same academic department. No elective may count for both a student's major and the war and peace minor. A relevant internship may be substituted for one of the electives. As they are announced, other relevant courses may be added to the list of acceptable electives. Students may request others not so listed. Courses carrying fewer than 4 credits will be counted as partial satisfaction of an elective requirement. If a good case can be made for it, a departure from any of these rules may be approved by the adviser for the minor and the coordinator.

All students will be assigned an adviser from the membership of the Committee on War and Peace Studies, ordinarily one not in the student's major department. The adviser will assist students in constructing a coherent program that suits their particular interests.

The core courses are INCO 401, War, and INCO 402, Peace. Occasionally a new core course may be devised.

Departmental elective courses will include the following:

AERO 681, National Security Forces in Contemporary American Society (3 cr.)
CMN 456, Propaganda and Persuasion
EC 535, Contemporary Conservation Issues
HIST 520, The Vietnam War
HIST 537, Espionage and History
MILT 413, The Defense Establishment and National Security (1 cr.)
MILT 502, American Military History (2 cr.)
POLT 562, Strategy and National Security Policy
POLT 761, International Law
POLT 778, International Organization
RECO 506, Population, Food, and Resource Use in Developing Countries
SOC 780, Social Conflict

Special offerings that may serve as electives:
ANTH 797, Advanced Topics in Anthropology (e.g., War and Complex Society)
ECON 698, Topics in Economics (e.g., Economics of War and Peace)
ENGL 595, Literary Topics; ENGL 693, 694, Special Topics in Literature; ENGL 797, 798, Special Studies in Literature (e.g., Literature of World War I, Literature of the Vietnam War)
HIST 600, Advanced Explorations in History (e.g., Comparative Revolutions)
HUMA 690, Special Studies in the Humanities (e.g., Nonviolence, Thinking about War and Peace)
INCO 404P, Understanding War
POLT 660, Special Topics in International Politics (e.g., Arms Control and Disarmament)

For more information, contact either Ken Fuld, Department of Psychology, or Michael Ferber, Department of English.

Preprofessional Programs

Prelaw

The Prelaw Committee of the University of New Hampshire recommends consideration of the following description of prelegal education.

Law schools are vitally concerned with the quality of preparation that students bring from their undergraduate experiences. Unless preparation has been of high quality, the law schools cannot equip their students for satisfactory performance within the legal profession and the democratic community.

The Prelaw Committee's responsibility in matters of prelegal education cannot best be met by prescribing certain courses and extracurricular activities for students planning to study law. The wide range of a lawyer's tasks opens a correspondingly wide range for choice in prelaw preparation. So-called law courses in undergraduate instruction should not be taken for the purpose of learning the "law." They are not likely to be effective as education for lawyers, although they can be very useful for teaching students "about law" and for helping them estimate whether they might be interested in law study.

While it considers the prescription of particular courses unwise, the committee can call attention to the quality of undergraduate instruction it believes fundamental to the later attainment of legal competence. That quality of education is concerned with the development in prelaw students of the following basic skills and insights.

Comprehension and Expression in Words

Language is the lawyer's working tool. He or she must be able, in the drafting of legal instruments, to convey meaning clearly and effectively. In oral and writ-

ten advocacy he or she must be capable of communicating ideas convincingly and concisely. In reception, no less than in expression, language is fundamental as the lawyer's medium of communication. For the lawyer must be able to grasp the exact meaning of factual statements and legal instruments, to catch the fine points of legal reasoning and argument, and to comprehend the technical materials that constitute the body of the law. To acquire sufficient capacity for communication requires extensive practice in all phases of the art. Truly, the legally trained man or woman must be precise in the use of the English language.

Critical Understanding of Human Institutions and Values
The purpose is to develop insight into, rather than merely information about, institutions and values: human nature and the physical world; the economic systems of societies; the democratic processes in western societies; the social structures of societies; the cultural heritage of western societies, including literature, history, philosophy, and ethics.

Creative Power in Thinking
The purpose is to develop the power to think clearly, carefully, and independently. A large part of the work legally trained people are expected to be able to do calls for problem solving and sound judgment. Creative power in thinking requires the development of skills in research, fact-completeness, marshaling and differentiation of facts, deductive and inductive reasoning, reasoning by analogy, critical analysis, constructive synthesis, and power of decision.

For additional information, please contact a member of the Prelaw Committee: Richard Desrosiers, at the Advising Center, 7 Hood House, (603) 862-2064, also in the Department of Classics, 303 Murkland Hall, (603) 862-3132; John Kayser, political science, Horton Social Science Center, (603) 862-1699; or Ann Morgan, recreation management and policy, Hewitt Hall, (603) 862-2391.

Premedical/Prehealth Care Professional Study

Students preparing for careers in medicine, dentistry, optometry, osteopathy, chiropractics, podiatry, pharmacy, and physician assistant programs should visit the Premedical/Prehealth Care Professional Advising Office in Hood House as soon as possible to become familiar with admission requirements. (For information on the Preveterinary Medicine Option in Animal Sciences, see page 82.) There is no premedical/prehealth professional major with a rigidly prescribed curriculum. Students are encouraged to major in subjects of their choice, either in sciences or nonsciences. In the past few years there has been a trend, particularly in premedicine and predentistry, away from exclusive concentration in a single area of science. Successful applicants from UNH have majored not only in sciences such as zoology, microbiology, biology, biochemistry, and chemistry but also English, history, languages, psychology, political science, and engineering as well as economics.

Students are assigned a faculty adviser from the department or school of their chosen major. The Premedical/Prehealth Care Professional Advising Office provides information and advice specific to the health care professions and provides confidential recommendation services at the time of application.

All medical and dental schools expect applicants to have demonstrated ability in the biological and physical sciences. The following courses constitute the *minimum requirements* for students to be considered for admission: biology, physics, general chemistry, and organic chemistry—all two semesters each with laboratory. A year of English, preferably composition, is required. One year of math, including at least one semester of calculus. An appropriate group of courses from among the offerings at the University would be the following: BIOL 411-412; PHYS 401-402; CHEM 403-404 (or 405-406, 405-517/518), 651/653, 652/654; ENGL 401, 501 or 503, 519, 529; MATH 424B and BIOL 528, or MATH 425, 426. Additional courses may be required by some professions, e.g., some dental schools require a semester of psychology.

Courses that qualify individuals for consideration as premedical, predental, or other preprofessional students should be completed by the time application to a professional school is submitted, usually by the end of the junior year. Inasmuch as performance in these courses is weighted heavily by the admissions committees, it is strongly recommended that students not register for them under the pass/fail grading alternative.

The following schedule is suggested for timing applications to medical and dental schools:

1. Students should apply to schools of their choice in the summer after their junior year if they wish acceptance following graduation. However, a delay of a year or more to complete courses or to gain exposure to the profession is neither detrimental nor unusual for acceptance into medical or dental school. Applications are accepted from June through October/November. Early applications are advantageous because most schools have a rolling admissions policy.

2. The Medical College Admission Test (MCAT) or the Dental Admission Test (DAT) must be taken before or at the time of application to medical or dental schools. The MCAT and DAT exams are preferably taken in the spring of the student's junior year (if the student is applying as a senior).

Among students from UNH who were accepted into medical and dental schools over the past five years, the competitive overall grade-point average was approximately 3.50 for medical school and 3.20 for dental school.

Interested students should contact the Premedical/Prehealth Care Advising Office early in their college careers, since services provided by this office are integral to the admissions process. Visit the office in Hood House or call (603) 862-3625 for an appointment.

Off-Campus Programs

UNH/UNHM Cross Registration

Matriculated students at the University of New Hampshire and the University of New Hampshire at Manchester may take UNH courses at either location. Students must have permission from their academic advisers and must register for the courses on a space-available basis. For more information and special registration forms, students should contact James Wolf, associate registrar, Stoke Hall, or Regina McCarthy, director of academic counseling, UNHM. See page 222 for UNHM course listings.

Consortium (NHCUC)
Student Exchange Program
Under the Student Exchange Program of the New Hampshire College and University Council (NHCUC), UNH students may be eligible to enroll for one or two courses, one semester of courses, or a full year of coursework at a member school, on a space-available basis. The consortium exchange allows matriculated undergraduates to use educational resources that are not available at the home campus and are considered appropriate for their degree programs. The consortium exchange will be used only when academic reasons or other special circumstances warrant it. Approval of the UNH adviser and college dean is required. Schools in the NHCUC consortium include Colby-Sawyer College, Daniel Webster College, Franklin Pierce College, New England College, New Hampshire College, Notre Dame College, Rivier College, St. Anselm College, UNH, Keene State College, and Plymouth State College. Students will remain as degree candidates and continue to pay normal UNH tuition and fees, but must make their own room and board arrangements if they plan to spend a full semester at another consortium school. For more information and application forms, students should contact Carolyn Tacy in the National Student Exchange Office in Hood House.

New England Subdegree Exchange Program

In order to provide students at the New England land-grant universities with expanded access to unique programs and faculty expertise, the institutions have agreed to encourage student exchanges of one, but not more than two, semesters. To qualify, students must identify a course or combination of courses related to their area of academic interest and not available on their home campus, be degree candidates in good standing with at least a 2.50 grade-point average, be at least first-semester sophomores, and receive permission from the appropriate university exchange authorities at both the sending and receiving institutions. Interested students should contact Carolyn Tacy in the National Student Exchange Office in Hood House.

Exchange Programs within the U.S.

The University offers many possibilities for exchange study with other American institutions. Exchange programs provide an educational experience in a different environment within the United States. It is hoped that students will develop new ways of viewing the country and expand their knowledge of our complex society.

A one-semester or full-year exchange program is available with the University of California, Santa Cruz. In addition, through the National Student Exchange, UNH students can study at more than one hundred forty colleges and universities throughout the U.S. and its territories (including, but not limited to, Montana, New Mexico, Utah, Colorado, Florida, Alaska, and Puerto Rico). Several historically black colleges and universities are exchange members and several are members of the Hispanic Association of Colleges and Universities.

To qualify for exchange study, students must be full-time undergraduate degree candidates with at least a 2.50 grade-point average, have declared a major, receive permission from their college dean and adviser, and receive permission from the exchange coordinator.

Students in exchange programs are expected to return to UNH to complete their studies. Participation in an exchange program does not disrupt the continuity of a student's educational process. Exchange program participants continue to maintain their status as UNH students, even while temporarily located at another university. Students thus do not have to withdraw from UNH and later be readmitted. Maintaining UNH student status also facilitates reentry into classes, on-campus housing, and many other dimensions of University life.

Interested students should contact Carolyn Tacy in the National Student Exchange Office in Hood House.

Study Abroad Programs

The University offers opportunities for full-time, degree candidates with a declared major, 32 credits, and minimum 2.50 cumulative grade-point average (excluding Thompson School work) to study in many foreign institutions. Opportunities in Canada, England, France, German-speaking countries, Hungary, Japan, the Netherlands, Puerto Rico, and Spain are described below. Students may study abroad in other locations through approved non–UNH programs by using the intercollege option (INCO). All students who transfer credit from study abroad through programs will be charged a transfer credit approval/ transcripting fee. For information on study abroad programs, students should contact the Center for International Education (Hood House) or the departments identified in the UNH-managed program descriptions below.

Canada

New England/Quebec Student Exchange Program
Students may spend one or two semesters during their junior or senior year at one of twenty French- or English-speaking universities in the province of Quebec. Eligibility requirements include a command of the language of the host campus, U.S. citizenship, and sophomore or junior standing. Contact the Center for International Education, Hood House, (603) 862-2398.

New England/Nova Scotia Student Exchange Program
Students may spend one or two semesters during their junior or senior year at one of eleven participating Nova Scotia institutions offering programs in the liberal arts, agriculture, business, engineering, art, and other fields. Eligibility requirements include U.S. citizenship and sophomore or junior standing. Contact the Center for International Education, Hood House, (603) 862-2398.

England

Cambridge Summer Program
For six weeks each summer, students from across the United States have the opportunity to participate in the UNH Cambridge Summer Program held at Cambridge University in England. Program participants take courses in English, history, and the humanities, taught by faculty from Cambridge University and UNH. Students live, dine, study, and socialize together at Gonville and Caius College, one of the oldest colleges at Cambridge. The program is open to students who have successfully completed at least one year of college; participation fulfills UNH's (Group 5) foreign culture, General Education Requirement. For more information, contact the director at the Department of English, Cambridge Program Office, 53 Hamilton Smith Hall.

London Program
At Regent's College in the heart of London, the University of New Hampshire sponsors courses in British studies, the arts, humanities, and a wide range of other basic subjects, offered during the fall and spring semesters. Taught by British and American faculty members, many of the courses are specifically concerned with British studies or have a special British emphasis. The program allows students to spend a semester or year in London while still making normal progress toward their U.S. degrees. To be eligible, students must have successfully completed at least one year of college, declared a major, and achieved an overall grade-point average of at least 2.50. Interested students should contact the program coordinator, London Program Office, 53 Hamilton Smith Hall.

France

Summer French Language Program in Brest
Qualified students may take the equivalent of FREN 503 and/or 504, the UNH Intermediate French sequence, or FREN 631 and/or 632, the UNH advanced French sequence, in Brest. A port city in the province of Brittany in western France, Brest is a sister city of Portsmouth, New Hampshire. The courses are offered consecutively in two intensive four-week summer sessions at the Centre International d'Études des Langues (CIEL). Students generally live with local families and attend classes a total of 24 hours per week. Credit for courses completed successfully will be automatically transferred to UNH. For more information, contact Barbara Cooper, Department of French and Italian, Murkland Hall.

Junior Year Program in Dijon
The Department of French and Italian sponsors a junior year abroad program at the University of Burgundy in Dijon, France. Students generally live with French families in the heart of this historic city and take classes at the university with French students. Credit for all work completed successfully will be automatically transferred to UNH. The program is open to those who have completed FREN 631-632 and FREN 651-652, with a grade of B or better. For more information, see Jack Yeager, Department of French and Italian, Murkland Hall.

Business Administration Program in Grenoble
The New England State Universities offer a spring semester of study in international marketing at the Group ESC Grenoble. This is an opportunity for students interested in international business, economics, and trade to participate in an English-speaking program while gaining exposure to French culture. The semester will begin early in January with a one-week orientation and introduction to France, followed by two weeks of intensive French language. Students will be assessed and placed in the appropriate level. Students will be enrolled in five courses: four taught by Grenoble faculty and one taught by the U.S. faculty member accompanying the group as resident director. The language of instruction is English. Students will earn 16 credits for the program. The program will continue until the end of May. During the semester there will be two one-week breaks and a one-week study trip.

Germany

Summer German Language Program in Berlin
Students with GERM 504 or equivalent proficiency may obtain 8 credits taking GERM 625-626, a course sequence focusing on improvement of language skills and exposure to the history and culture of contemporary Berlin. The course is taught by UNH staff; students are housed at the Glienicke International Youth Center (IBJG) and with Berlin host families. The program is offered during late May and June (six weeks for 8 credits) and may count toward a German major or minor. Further information is available in the Department of German and Russian.

Programs in German-Speaking Countries
In addition to the UNH summer program in Berlin, students may study for a summer, a semester, or a full year through an approved American study abroad program or by applying directly to universities in Germany, Austria, or Switzerland. Study abroad plans should be discussed with an adviser as early as freshman year. Students must submit a Prior Approval Form after consultation with the major adviser and the study abroad adviser to establish possible UNH equivalents and fulfillment of major and/or general education requirements. To ensure proper credit transfer, students should keep syllabi, course descriptions, and all coursework to document their accomplishments abroad. American programs vary in size, quality, content, and cost. For credit in the German major or minor, the program must be conducted in German. Most programs require a minimum grade-point average of 3.00 and a B average in one's major. To study abroad in a program other than the UNH Berlin Seminar, German majors register for GERM 685 or 686 and nonmajors register for INCO 685 or 686.

Hungary

Budapest University of Economic Sciences
Students may spend the fall semester of their sophomore, junior, or senior year in Budapest, Hungary. Participants take classes in English that are approved for UNH credit toward major, minor, and general education requirements. Courses in the social sciences, political science, economics, and business are taught at the Budapest University of Economic Sciences, an internationally recognized institution in both education and research. During their semester abroad, students gain an understanding of international history and the impact of modern America and industrialization on eastern Europe. Contact the Institute for Policy and Social Science Research, Thompson Hall, (603) 862-2186.

Engineering and Physical Sciences Exchange Program in Budapest
The College of Engineering and Physical Sciences has arranged an opportunity for its students to spend the fall semester of their junior year at the Technical University of Budapest in Budapest, Hungary. Courses at TUB are taught in English and receive prior approval for degree credit. Students studying at Budapest, therefore, will graduate on schedule at UNH. A general education course on the language, geography, and culture of Hungary, taken at TUB, is required. The foreign student office at TUB will appoint a Hungarian adviser for each student and will assist in obtaining housing either in dormitories, or in apartments. Further information is available from the college's associate dean and the college's foreign exchange program coordinator, Andrzej Rucinski, Department of Electri-

cal and Computer Engineering. For more information, visit the Web site for the program at: http://www.ceps.unh.edu/academics/tubbrochure/tub.html

Japan

Kansai Gaidai University, Osaka
Students may spend one or two semesters during their junior or senior year at Kansai Gaidai University in Osaka, Japan. Program participants study the Japanese language, business, politics, literature, fine arts, and other courses. Eligibility requirements include a 3.00 grade-point average and sophomore, junior, or senior standing. Contact the Center for International Education, Hood House.

The Netherlands

Program at the Institute of Higher European Studies in The Hague
The Center for International Education administers a semester abroad at the Institute of Higher European Studies in The Hague, The Netherlands. All classes are in English. This program is available to sophomores, juniors, and seniors. The Netherlands provides easy access to all of Western Europe and is a wonderful and easy country in which to live and travel. The curriculum at the institute offers a rich international perspective to students. Interested students should contact the Center for International Education, Hood House, (603) 862-2398.

Puerto Rico

University of Puerto Rico at Mayaguez
Students may spend one or two semesters at the University of Puerto Rico (UPR) at Mayaguez, the second largest of the three major campuses in the UPR system. While having the opportunity to learn in a Latin American environment, participants maintain their status as UNH students, pay UNH tuition, and will be able to graduate from UNH on schedule. The exchange is open to students and faculty members from all UNH majors. Since eighty percent of all courses at UPR are taught in Spanish, participants must be proficient in Spanish. Interested CEPS students should contact Carol French, (603) 862-1783 in the Office of the Dean, Kingsbury Hall.

Spain

Granada Program
The Granada program is administered jointly by the Spanish departments of the Universities of New Hampshire, Connecticut, and Rhode Island. Students may spend one or two semesters in a program designed for those who have completed SPAN 631 or its equivalent, have a B average in Spanish and a cumulative grade-point average of 2.50, and have at least sophomore status. Courses taught by professors from the University of Granada fulfill requirements for the Spanish major and minor and general education requirements in humanities areas. Deadlines for fall applicants is March 1; for spring applicants, October 1. For further information, contact the Department of Spanish and Classics, 209 Murkland Hall. (See also SPAN 685, 686 on page 213.)

Other Programs

Honors Program

The University of New Hampshire has a tradition of encouraging academic achievement through its twenty-one honorary societies, including active chapters of Phi Beta Kappa and Phi Kappa Phi. In 1984, the University took another step toward the recognition of outstanding students by establishing an undergraduate honors program. The University Honors Committee, made up of representatives from all colleges of the University, the Office of Admissions, the Division of Student Affairs, and the Registrar's Office, supervises the operation and requirements of the program.

There are two ways to enter the University Honors Program:

1. The Office of Admissions identifies a number of qualified incoming freshmen who are then invited to submit an application to the honors program. The honors committee reviews these applications and determines admission to the program.

2. Freshmen who achieve a grade-point average of 3.20 or better during their first semester are also invited to join the program.

Participation in the University Honors Program does not add courses to those required to graduate. The first two years of the program focus on general education requirements. Students take a minimum of four honors-designated general education courses, one of which is an honors seminar based on a special topic. All students must attain a cumulative grade-point average of 3.20 by the end of their sophomore year in order to continue in the honors program.

The upperclass part of the honors program consists of honors work in the majors. A booklet describing these programs is available in department and college advising offices as well as in the Honors Program Office. Programs with "honors in major" work are animal sciences, anthropology, arts, biochemistry, biology, business administration, chemistry, chemical engineering, civil engineering, classics, communication, communication disorders, computer science, earth sciences, economics, English, electrical and computer engineering, environmental conservation, environmental horticulture, environmental and resource economics, family studies, forestry, French, geography, German, health management and policy, history, hospitality management, humanities, kinesiology (exercise specialist option), linguistics, mathematics, mechanical engineering, medical laboratory science, microbiology, music, nursing, occupational therapy, outdoor education, philosophy, physics, plant biology, political science, psychology, Russian, social work, sociology, Spanish, theatre, wildlife management, women's studies, and zoology. Successful completion of University Honors Program requirements entitles the student to receive the designation "University honors in major" on his or her academic record and diploma. Completion of "honors in major" only is similarly denoted. The University Honors Committee has developed a "University honors" option for students in majors that do not offer honors work.

To satisfy honors program requirements, students must have a final cumulative grade-point average of 3.20 and meet the grade point average requirements of their honors-in-major program. All courses used to achieve "University honors," "University honors in major," or "honors in major" must have a minimum grade of B–.

Full-tuition and partial-tuition merit-based scholarships are available to a select number of incoming freshmen. Several partial-tuition scholarships are also

awarded to upper-class students. For more information, please contact Robert Mennel, director, University Honors Program, Hood House.

Reserve Officer Training Corps Programs

The Army and Air Force offer Reserve Officer Training Corps (ROTC) programs leading to a commission as a second lieutenant in their respective services. Both programs are open to men and women. Students in either ROTC program may pursue any University curriculum that leads to a baccalaureate or higher degree.

Two- and four-year programs are available. The four-year program is open to freshmen, sophomores, and transfer students who began ROTC at another institution. In addition to on-campus ROTC course requirements, students must attend an officer preparatory training session for a part of one summer.

ROTC is open to students pursuing a baccalaureate degree who have a minimum of two academic years or more remaining within their degree program. Entering freshmen may preregister for MILT 413 (AROTC) or AERO 415 (AFROTC). Sophomores desiring to enter ROTC should check with either the Army or Air Force enrollment advisers located in Zais Hall.

Two-year ROTC programs are open to students who have two academic years of study remaining at the University. Applicants for the two-year program must attend a six-week training session during the summer immediately before their entry into ROTC.

ROTC scholarships are offered on a competitive basis by both the Army and Air Force. Entering freshmen may compete for four-year scholarships during the last year of high school. Additionally, incoming students with either a four-year or three-year ROTC scholarship will receive a room and board grant for the entire time that they are on an ROTC scholarship. Students in a four-year ROTC program and two-year program applicants compete for scholarships covering their remaining academic years. Scholarships pay for tuition, mandatory University fees, and required textbooks for all courses. Limits may be placed on these scholarships dependent upon the type and amount of expenses incurred. In addition, all scholarship recipients receive a tax-free $150-per-month subsistence allowance. Nonscholarship students in the last two years of the ROTC program also receive the tax-free $150-per-month subsistence allowance.

Both programs have administrative and medical requirements which must be met to qualify for a scholarship and commission.

More specific information about ROTC programs may be obtained by contacting the professor of military science (Army ROTC) or the professor of aerospace studies (Air Force ROTC).

Undergraduate Research Opportunities Program (UROP)

Students can enhance their undergraduate education through collaborative research projects with faculty members. The Undergraduate Research Opportunities Program offers participants the chance to improve research skills and to acquire an understanding of the nature of research in an academic field. Students may apply to the program to receive awards and fellowships in support of their research projects. They may conduct their research on campus or at appropriate research sites in the United States and abroad. Participation in the program can also aid students in making choices and developing plans concerning careers and graduate schools. For information, please contact Donna Brown, director, UROP Office, Hood House, (603) 862-4323.

International Research Opportunities Program (IROP)

IROP offers students opportunities for advanced research at the undergraduate level and in an international setting. It enables students to colloborate with both UNH faculty members and foreign researchers. And it integrates an international experience and global awareness within the students program of study. Students may apply for fellowships to support nine weeks of research during the summer working with the foreign research partners of UNH faculty. Students accepted into the program will complete language, culture, and research training before leaving and will share their research and cultural experience upon returning. Projects may include library/archival research, laboratory research, or field research. Research opportunities are available throughout the world including Latin America, Canada, Europe, Africa, and Asia. For more information, please contact Paul Josephson, program coordinator, IROP Office, Hood House, (603) 862-1933.

Thompson School of Applied Science

Regina A. Smick-Attisano, Director
Davis H. Burbank, Assistant Director
Emily J. Creighton, Admissions Coordinator

Applied Animal Science
- Dairy Management
- Equine Management
- Small Animal Care

Applied Business Management
- Business Computing
- Business Management

Civil Technology
- Architecture Technology
- Construction Management
- Surveying and Mapping

Food Services Management
- Dietetic Technician
- Restaurant Management

Forest Technology
- Forest Technician

Horticultural Technology
- Landscape Operations
- Floriculture Operations
- General Ornamental Horticulture

The Thompson School of Applied Science is a division of the College of Life Sciences and Agriculture within the University offering the associate in applied science degree. A combination of science-based education, professional preparation, and practical experience qualifies graduates for employment as technicians, professional assistants, and supervisors in business and public organizations, or as small-business owners.

Faculty

The most valuable resource at the Thompson School of Applied Science is its faculty. These highly qualified teachers have significant work experience in industry; a commitment to practical, science-based education; extensive and up-to-date knowledge of their specialties; ongoing contacts with practicing professionals; and most important, dedication to students and to excellence in education.

Thompson School faculty members work closely with students, providing academic advising, career counseling, and special assistance when needed.

Facilties

Another great resource of the Thompson School is its classrooms, laboratories, and working enterprises, designed for practical, career-related experience under realistic conditions. These facilities are supplemented by the University's 3,942 acres, including the large Durham campus; 2,400 acres of forest and woodland; and 620 acres available for hay, tillage, orchards, and research plots.

Associate Degree Programs

The Thompson School of Applied Science offers the following professional program specializations:

Applied Animal Science

Applied animal science provides students with hands-on practical skills combined with knowledge and understanding of the latest technology. The core program provides a solid background in anatomy, physiology, nutrition, health, and animal breeding. In addition, students choose a specialization in either equine management, dairy management, or small animal care. Each specialization also allows for choices of elective courses in other areas.

Practical learning experience is provided at the UNH equine facilities and the UNH Dairy Center. The Thompson School also operates its own grooming shop and biology laboratories. The curriculum has a number of animal-related educational programs, including cooperative arrangements with local humane shelters, a pet-assisted therapy program, and field trips to animal-related businesses.

Applied Business Management

The applied business management program combines class work and practical experience to give students a thorough understanding of the business field. Along with a core curriculum of skills in accounting, human resource management, and communications, students choose to specialize in either business computing or business management. In the business computing specialization, students study operating systems, database management, spreadsheet applications, and accounting with microcomputers. The business management specialization allows students to develop skills in accounting, marketing, management, sales, and business law. After their first semester, students may take up to three elective courses chosen from University course offerings with approval.

Practical experience is gained through research projects with local industries, municipalities and state agencies, and student-run businesses. Students may also elect to take internships with area businesses.

Civil Technology

Civil Technology is a dynamic educational opportunity offering skill based learning through class instruction, exten-

sive laboratory experience, and fieldwork. Students choose from one of the following specializations: architectural technology, construction management, and surveying and mapping.

The cornerstone of the educational experience is instruction in computer aided design (CAD) using the Thompson School's state-of-the-art CAD lab. Students in field surveying use the latest surveying equipment and students studying geographical information systems (GIS) use the new GIS Instructional Lab. Additional coursework covers building science, construction contracting, materials, soils, and methodologies of professional practice in the concentration specialities.

Food Services Management

The Food Services Management program has two distinct areas of concentration: Restaurant Management and Dietetic Technician. Students in the Dietetic Technician concentration earn an associate degree by completing coursework in nutritional sciences, food preparation, food service management, community nutrition, diet therapy, nutrition education and counseling. Students must also complete 450 hours of supervised practical experience in local health care and food service facilities, and in community programs. Upon completion of the program, students are eligible to take the Registration Exam for Dietetic Technicians and earn the credential "DTR" or Dietetic Technician Registered. As nutrition professionals, Dietetic Technicians may work independently or with a Registered Dietitian in clinical settings such as hospitals and nursing homes, food service management settings in hospitals, long term care and schools, and health promotion programs such as community agencies and wellness programs.

The Restaurant Management concentration is a combination of classroom and hands-on experiential learning. Course topics include food production, facilities and equipment planning, hospitality and personnel management, food and beverage accounting, and food and beverage purchasing and sales. Students train in state-of-the-art kitchens and operate two restaurants located in the Thompson School. An additional program requirement is a preapproved summer internship in the restaurant industry. All students participate in the various aspects of a full-service restaurant. Students also gain experience through coursework and apprenticeships in campus dining facilities such as the UNH Dairy Bar, the New England Center, and UNH Dining Services. Extracurricular learning and earning opportunities are available in restaurants in the nearby Seacoast area.

Forest Technology

Students in the Forest Technology program are uniquely prepared for careers in the forest industries and natural resource management in New Hampshire and New England. Classroom lecture is backed up by very practical field work in each of the subject areas. The curriculum is recognized by the Society of American Foresters and reviewed by an advisory committee representing the full spectrum of forestry organizations in the region. Graduates have a wide variety of career paths available to them including the forest products industries, public and private forest land management, forestry consulting, urban tree care, and a broad array of forestry conservation organizations. The instruction provided is designed to prepare students for middle management and supervisory positions within organizations or owning and operating small businesses. There is strong emphasis on leadership, safety, communication skills, accuracy of field work, data collection, and professional presentation. Unique facilities for teaching and learning include centrally located classroom and shop facilities, 3,000+ acres of University-owned forest land, a sawmill and logging equipment, and a faculty dedicated to teaching with vast field experience in the subject areas.

Horticultural Technology

Horticultural technology students gain knowledge and skills in the art and science of applied plant biology, preparing for environmentally attuned careers in the Green Industry. Rigorous first-year foundation courses in plant materials, plant growth and development, and soils and pest management support second-year specializations in floriculture operations, landscape operations, or general ornamental horticulture. Employment opportunities in these areas continue to be excellent. Graduates enter a rapidly expanding job market in greenhouse production, floral design, nursery and garden center management, interior plantscaping, parks and grounds management, golf course management, arboriculture and urban forestry, fruit and vegetable production, and landscape design, construction, and maintenance. Many recent graduates have established their own horticulture enterprises.

Admissions

The Thompson School of Applied Science welcomes applications from high school, transfer, and adult students who meet the admission standards of the University of New Hampshire.

High school students who plan to enter the Thompson School after graduation will be considered on the basis of their high school course selection, academic achievement, class rank, and high school recommendations. Emphasis is placed on the applicant's personal motivation, demonstrated interest in a career field, and preparation for college-level studies.

Adult students who have earned a high school diploma (or equivalent) will have both their academic record and their accomplishments since high school considered in the application process. Important factors include the student's professional work experiences and advancements and motivation to succeed at college-level studies.

A number of Thompson School specializations require evidence of satisfactory work in high school preparatory courses. Specific requirements for admission are detailed for each specialization in the *Thompson School Catalog*.

How to Apply

You may request a *Thompson School Catalog* and an application for admission by mail, phone, or e-mail. Mailing address: Thompson School of Applied Science, Cole Hall, 291 Mast Road, Durham, NH 03824-3562; (603) 862-1025; e-mail address: tsas.admit@unh.edu. Applications may be submitted at any time during the calendar year. Notice of admission to the Thompson School will normally be sent within thirty days following receipt of all required information.

Campus Visits

Prospective students are encouraged to participate in an interview, visit during an open house, and/or take a tour of the Thompson School and UNH. Open houses are conducted in the fall and the spring. Interviews are usually conducted by a student admissions representative, which will give you a sense of the Thompson School from a student's perspective. To attend an open house or to arrange your visit, please contact the Thompson School at (603) 862-1025 or visit our Web site at www.unh.edu/thompson-school

Transfer Opportunities

The primary goal of the Thompson School is to prepare students to acquire the necessary knowledge, skills, and experience to enter employment in their field at the end of two years. However, opportunities do exist to continue education and earn a bachelor's degree.

Graduates with the associate in applied science degree may continue their education in a UNH baccalaureate degree program. A grade-point average of at least a 2.50 at the completion of the associate degree is generally required for transfer consideration. Some UNH programs require a higher G.P.A. to be admitted. Successful completion of a bachelor's degree will, in most cases, require two-and-a-half to three years of additional study at UNH. Thompson School students are encouraged to work closely with their adviser and professors to understand and prepare for transfer opportunities. Many other colleges and universities also welcome Thompson School graduates.

Expenses, Financial Aid, and Scholarships

Costs for students include tuition, room and board, required curriculum and lab fees, books and supplies, and personal and travel expenses. For information about scholarships, loans, and work study, write the Financial Aid Office, Stoke Hall, 11 Garrison Avenue, Durham, NH 03824-3511; or call (603) 862-3600. A financial aid form must be on file to be considered for many scholarships.

The Thompson School and the College of Life Sciences and Agriculture also provide scholarship opportunities for Thompson School students. Call (603) 862-1025 for a list of these possibilities.

University of New Hampshire at Manchester

Karol A. LaCroix, Dean
Peter Haebler, Associate Dean

Bachelor of Arts
Communication
English
History
Humanities
Psychology

Bachelor of Science
Business Administration (WSBE)
Electrical Engineering Technology
Mechanical Engineering Technology
Nursing (Registered Nurse Baccalaureate Program)
Sign Language Interpretation

Associate in Arts
General Studies
Studio Arts

Associate in Science
Biological Sciences
Business Administration

Credit Certificate Programs
Sign Language Interpretation

Certificate Programs for Professional Advancement
Business and Accounting Skills for Managers
Communication Skills for Managers
Human Behavior Studies

The University of New Hampshire at Manchester was established in 1985 to increase access to a University education for people who live and work in central New Hampshire. The newest college of the University offers associate and selected bachelor's degrees, access to other UNH undergraduate and graduate degree programs, special courses, workshops, seminars, and cultural events for the region.

Degree Programs

The University of New Hampshire at Manchester (UNHM) offers bachelor of arts degree programs in communication, English, history, humanities, and psychology and bachelor of science degree programs in business administration, electrical engineering technology, mechanical engineering technology, nursing (registered nurse certification required), and sign language interpretation. Students are required to satisfy University requirements, which include 128 credits, a 2.00 minimum cumulative grade-point average, general education requirements, and, for the bachelor of arts degree, a foreign language requirement. The foreign language is not required in the bachelor of science programs.

Students can also pursue UNH associate in arts or associate in science degree programs full or part time with a choice of concentrations. Requirements for the associate degrees include completion of 64 credits, a 2.00 minimum grade-point average, and an interdisciplinary core course. Those students who complete the last 16 credits of the associate degree with a grade-point average of at least 2.50, earn a cumulative associate degree grade-point average of 2.50 or higher, and are recommended by their academic advisers are guaranteed admission to a baccalaureate program at the University in either Durham or Manchester. The University does not, however, guarantee admission to a specific college or program.

Selected graduate degrees from UNH are also available through the University of New Hampshire at Manchester.

Minors

The following academic minors are available at UNHM for enrolled baccalaureate candidates. Further information may be obtained from the Academic Counseling Office, (603) 629-4170.

American Sign Language and Deaf Studies
Art
Computer Information Systems
Education
English
History
Humanities
Philosophy
Political Economy
Political Science
Psychology
Sociology

Pre-Majors

Students entering the associate in arts program in general studies may prepare for transfer admission to many baccalaureate degree programs available through the University's Manchester and Durham campuses. By working closely with an academic adviser, general studies students can select structured course plans or pre-majors that are compatible with almost every baccalaureate major.

Credit Certificate Program

Sign Language Interpretation (18 courses, 72 credits)

UNHM offers a credit certificate program in sign language interpretation. This program is designed for individuals who want to add to their career or change careers to the field of sign language interpretation. This program is open only to those students who have completed at least a baccalaureate degree program and requires four years (eight semesters) to complete.

Certificate Programs for Professional Advancement

UNHM's credit certificate programs are designed for individuals who want to enhance their credentials for a new position or to take the first step toward a college degree. The programs also meet the needs of working professionals with postsecondary degrees who need to expand their knowledge or update their skills.

Each program provides a concentrated learning experience in a specific subject area designed for students with varied educational backgrounds and experience. Students must complete four required courses at UNHM in their chosen program to earn a certificate. The college's accessible course schedules allow students to attend day, evening, or Saturday classes, full or part time.

Communication Skills for Managers (4 courses, 16 credits)

The fundamentals of oral and written communications are presented in this certificate program. Critical thinking is emphasized. Students learn to read, write, and speak more effectively both personally and professionally.

Business and Accounting Skills for Managers (4 courses, 16 credits)

Students gain a basic understanding of American businesses and how they work. A general overview of the functional areas in business as well as fundamental concepts of accounting, finance, and the use of computers to manage information is presented in the coursework.

Human Behavior Studies (4 courses, 16 credits)

An understanding of psychological, cultural, and social aspects of human behavior is developed in this program. The coursework explores how culture and intellect influence behavior and communication with others.

College Transition Program

The University of New Hampshire at Manchester's College Transition Program (CTP), formerly known as the Alternative Freshman Year (AFY) Program, enables students to begin their University studies as candidates for the associate in arts degree while receiving an intensive yearlong (two semesters) plan of academic support and study skill enhancement.

Students are identified as CTP eligible during the standard admission application review process and may enter the program during the fall semester. Typically, CTP students register for credit-bearing courses on a part-time basis. In some instances, CTP students may be required to supplement their academic schedules with noncredit coursework to strengthen writing or quantitative skills.

Attendance at the New Student Orientation and enrollment in a Strategies for Success Workshop are required for all CTP students. After orientation, CTP students work closely with academic advisers to design appropriate course plans, establish performance goals, determine which learning support services are required, and monitor academic achievement.

Students who successfully complete two semesters of CTP may continue on to earn their associate degree through either full-time or part-time study.

UNHM Application Deadlines

The application deadline for the fall semester is June 15 and for the spring semester is November 1. For priority consideration for financial aid, the application deadline is May 1 for the following academic year.

For More Information

UNHM courses are listed on page 222 of this catalog. To receive a UNHM bulletin, catalog, or more specific information on UNHM courses and programs, contact the Office of Admissions, University of New Hampshire at Manchester, French Hall, 220 Hackett Hill Road, Manchester, NH 03102, phone (603) 629-4150; fax (603) 623-2745; TTD (603) 668-0918.

Division of Continuing Education

William F. Murphy, Dean

The Division of Continuing Education provides access to higher education for residents of New Hampshire and surrounding areas. Whether individuals are pursuing college study for academic, professional, or personal enrichment, UNH continuing Education courses and programs enable them to participate in University programs appropriate to their changing educational needs. These needs may at times be best satisfied through participation in workshops, seminars, short courses, or certificate programs—at other times by enrollment in credit courses and degree programs.

The faculty of the Division of Continuing Education is drawn from the teaching staffs of the University and from experts in business, industry, and the community.

In addition to the programs listed below, it is possible to complete many of the degree requirements in other areas of study offered by the University through enrollment in credit courses scheduled by the Division of Continuing Education each semester and during the summer.

Associate in Arts Degree

The associate in arts degree gives students an opportunity to obtain a general, two-year college education and to elect coursework in several career-related fields. The program is particularly suited to adults who are returning to the University after an interruption in their studies, who wish to be either full- or part-time degree students, and who need some time to establish their academic goals.

A wide range of University credit courses is available during both the daytime and the early evening hours.

Within the A.A. program, students have the opportunity to complete concentrations in a broad range of subjects offered by all of the schools and colleges or to take courses in several fields of study to explore a major, or they may elect to concentrate in computer information studies or pre-engineering and physical sciences. (For descriptions of courses, see page 140.)

The degree can be complete in itself or it can be a halfway mark toward a bachelor's degree. Credits earned as an A.A. degree candidate are transferable into related baccalaureate programs at UNH and other colleges and universities.

Admission Requirements

For the associate in arts degree program, candidates must have a high school diploma or an equivalency certificate and should have demonstrated ability and motivation through academic achievement, work experience, and/or military service. Associate in arts degree candidates are not guaranteed housing but are encouraged to contact the Department of Housing, (603) 862-2120, to explore possibilities.

Graduates of associate in arts programs are usually awarded a minimum of 64 credits upon entry into a UNH bachelor's degree program. Degree candidates wishing to continue their studies should consult with their advisers to ensure that their planned programs meet the specific requirements for the selected major at the institution awarding the bachelor's degree.

The associate in arts degree program is offered on a full-time and a part-time basis. Students interested in the A.A. degree program should obtain the application form from the UNH Admissions Office or from the Division of Continuing Education.

Degree Requirements

For degree requirements, see page 20.

Career Concentrations

Computer/Information Systems Applications

A career in computer information offers excellent opportunities for advancement and professional growth for individuals with appropriate training. Because computer information specialists are essential in today's technological, information-oriented society, qualified men and women will be in constant demand. Long-range employment forecasts predict solid, continuing growth well into the next decade.

This career concentration trains individuals for such entry-level positions as data analyst, applications technician, programmer, and computer operations supervisor. Graduates should be qualified to work on projects that involve equipment ranging from personal computers to large-scale hardware.

Required computer information studies courses: CS 403; DCE 491 and DCE 492 (or CS 401); DCE 590, 591, and 592.

Pre-Engineering and Physical Sciences

Adults who desire a University degree in engineering or the physical sciences may enroll on a full- or part-time basis through the associate in arts degree program.

This program satisfies first-year course requirements of most B.S. programs in engineering and physical sciences. For further information, see separate Pre-Engineering Bulletin.

Required courses: MATH 425-426; PHYS 407-408; CHEM 403-404.

Academic Regulations and Pass/Fail

Associate in arts degree candidates are subject to the academic requirements established by the University for all students.

Associate in arts degree candidates, after completion of a minimum of 16 credits at UNH on a regular graded basis of A to F, may use the pass/fail grading alternative in a maximum of two elective 4-credit courses. The pass/fail grading alternative may be used for a maximum of 4 credits per semester. No pass/fail grading alternative may be used in fulfillment of University general education requirements or for courses in students' declared career concentrations. The minimum passing grade for credit is a D– (0.67).

Advising

Program planning and other advising services are provided by the professional staff of the Division of Continuing Education. Academic advisers are available from 8:00 A.M. to 4:30 P.M. daily and during evening hours on an appointment basis.

Financial Aid

Associate in arts degree candidates are eligible for the full range of financial aid offered by the University. See the Financial Aid section of this catalog.

Special Student Status

Special students—those who are not formally admitted into a degree program at the University of New Hampshire—may enroll in University credit courses each semester through the Division of Continuing Education.

All special undergraduate students are limited to 12 credits per term unless they obtain written permission from the director of admissions, Grant House. Special graduate students are also subject to enrollment limitations. Contact the Division of Continuing Education for details.

Undergraduate Courses

Special students must have a high school diploma or its equivalent or be at least 18 years of age.

Graduate Courses

Special students must hold a bachelor's degree or equivalent from a regionally accredited college or university.

Prerequisites

All students are responsible for satisfying course prerequisites, if any. Instructors may require students to withdraw from a course if they are not adequately prepared for the level of work.

Academic Standards

A cumulative grade-point average of 2.00 (C grade) is the minimum acceptable level for undergraduate work in the University. The records of special undergraduate students are examined periodically; academically deficient or potentially deficient students may be warned, excluded, or suspended.

Noncredit Courses and Workshops

Throughout the year, the Division of Continuing Education offers a wide range of noncredit courses, seminars, and workshops to the community. These offerings provide opportunities for personal growth or professional continuing education in business, industry, teaching and education, government, or the professions.

Professional seminars typically meet for one or two days while courses meet in the evenings, one night a week. Topics are offered in management and supervision, computers, graphic arts, teaching, and human resources, engineering and manufacturing, nonprofit management, health and human services, and many more.

Personal enrichment courses are offered during the day and evening, during the week, and on weekends. Examples include physical fitness and recreation, parent-child communication, arts and crafts, local history, current events, personal financial planning, creative writing, and photography.

Noncredit Certificate Programs

Certificate programs consist of specifically developed sequences of courses or workshops that provide a sound balance of theory, fundamentals, practical skills, and specialized training. Certificates of achievement awarded by the Division of Continuing Education have earned professional acceptance as evidence of increased knowledge in basic principles and techniques.

Noncredit certificate programs include graphic arts, computer applications, human resources management, supervisory training, desktop publishing, CAD, workplace safety, and train the trainer.

Conferences

The Division of Continuing Education also conducts conferences, institutes and symposium, which range from half-day briefings on specific topics to residential programs lasting several days or weeks. Such programs are offered on topics of professional, managerial, or technical interest, or current issues of concern in business, industry, and the professions.

The Division of Continuing Education uses the facilities of the entire University campus for its programs, including the New England Center, the Pease Education and Training Center, and nearby commercial establishments.

Course Charges

Students who enroll in credit courses through the Division of Continuing Education pay on a per-credit basis, depending on course level. These course charges are listed in the Division of Continuing Education Catalog published before each semester. The course charges for noncredit courses and for conferences, workshops, and institutes vary according to the scope of the individual programs.

Class Schedule

While students may enroll in morning and afternoon classes through the Division of Continuing Education, many courses offered each semester are scheduled in the late afternoon and early evening to accommodate working adults.

All courses offered by the University each semester are open to special students on a space-available basis.

For More Information

For further information about programs or services, course offerings, registration procedures, and academic requirements, call or write the Division of Continuing Education, University of New Hampshire, Stoke Hall, 24 Rosemary Lane, Durham, NH 03824-3529, (603) 862-4234; e-mail to: learn.dce@unh.edu; or visit the Web site at www.learn.unh.edu. Students may also register for courses on the Web using a credit card.

Graduate School

Bruce L. Mallory, Dean
Harry J. Richards, Associate Dean

Master of Arts
Counseling
Economics
English
- Literature
- Language and Linguistics
- Writing

History
Music
Political Science
Psychology
Sociology
Spanish

Master of Science
Accounting
Animal and Nutritional Sciences
Biochemistry
Biology
Chemical Engineering
Chemistry
Civil Engineering
Communication Disorders
Computer Science
Earth Sciences
- Geology
- Oceanography

Electrical Engineering
Family Studies
- Marriage and Family Therapy

Genetics
Hydrology
Kinesiology
Mathematics
- Applied Mathematics
- Statistics

Mechanical Engineering
Microbiology
Music Education
Natural Resources
- Environmental Conservation
- Forestry
- Soil Science
- Water Resources
- Wildlife

Nursing
Occupational Therapy
Ocean Engineering
Physics
Plant Biology
Resource Administration and Management
Resource Economics
Zoology

Master of Arts in Teaching
Elementary Education
Secondary Education

Master of Science for Teachers
Chemistry
College Teaching
English
Mathematics

Master of Education
Administration and Supervision
Counseling
Early Childhood Education
- Special Needs

Elementary Education
Reading
Secondary Education
Special Education

The Graduate School offers a wide range of programs leading to the master's degree, one program leading to the C.A.G.S., and a number of programs leading to the Ph.D. degree. Graduate programs have been developed systematically to achieve academic excellence by careful utilization of institutional resources and regional opportunities. A highly qualified graduate faculty supervises programs and establishes the requirements for admission and degrees, which are administered by the dean of the Graduate School.

Master of Adult and Occupational Education

Master of Arts in Liberal Studies

Master of Business Administration

Master of Health Administration

Master of Public Administration

Master of Social Work

Certificate of Advanced Graduate Study
Educational Administration and Supervision

Doctor of Philosophy
Animal and Nutritional Sciences
Biochemistry
Chemistry
Computer Science
Earth Sciences
- Geology
- Oceanography

Economics
Education
Engineering
English
Genetics
History
Mathematics
Mathematics Education
Microbiology
Natural Resources
Physics
Plant Biology
Psychology
Reading/Writing Instruction
Sociology
Zoology

Admissions

Persons holding a baccalaureate degree from an accredited college or University and wishing to take graduate-level courses at the University as part of a graduate degree program must apply for admission to the Graduate School. Admission to the Graduate School is both limited and competitive and is based solely upon academic qualifications and potential.

Applications for admission and the Graduate Catalog, containing detailed descriptions of graduate programs, may be obtained from the Graduate School, Thompson Hall, 105 Main Street, Durham, NH 03824-3547. The Graduate School also maintains a Web site at http://www.gradschool.unh.edu

Early Admission—University of New Hampshire Seniors

Qualified senior students at the University of New Hampshire may be admitted to the Graduate School provided they have followed normal application procedures; they must have been admitted for the semester in which they wish to enroll in courses for graduate credit. A 3.20 cumulative grade-point average is normally required to be considered for early admission. Such seniors are normally admitted prior to the start of their last undergraduate semester. Seniors who have been admitted under early admission may register for a maximum of two courses for up to 8 graduate credits.

Dual Credit—UNH Seniors

University of New Hampshire seniors who have been admitted to the Graduate School under early admission may, upon recommendation of the department and approval of the Graduate School, be allowed a maximum of two graduate-level courses for up to 8 credits toward both a bachelor's and master's degree. Dual credit forms must be completed and ap-

proved by the dean of the Graduate School at the beginning of the semester for which dual credit is sought. Dual credit forms are available at the Graduate School.

Admission to the 3/2 Program

Undergraduate UNH students may be admitted to one of the approved five-year combined bachelor's degree/master of business administration programs (see page 95), which normally commence during the fall semester of their senior year. Application to the Graduate School is made during the second semester of the junior year. Interested students should contact the Whittemore School for information.

Financial Assistance

Graduate assistantships are available in most departments. These involve part-time work in connection with the University's instructional or research activities. University awards, such as tuition scholarships, are also available to qualified students. Assistantships and scholarships are awarded on the basis of academic qualifications.

Financial assistance in the form of college work study and loans may be available through the Financial Aid Office.

Summer Session

William F. Murphy, Dean

The University of New Hampshire offers students the opportunity to continue their studies on a yearround basis through multiple terms during the summer months. The summer courses are of the same high quality as those during the regular academic year and require the same level of academic performance.

Summer Session offerings include a broad range of undergraduate and graduate credit courses in most of the major academic disciplines. Throughout the summer, classes are scheduled in the morning, afternoon, and evening. Special institutes for teachers and other professionals are also offered during the summer and vary in length depending on content.

Enrollment in Summer Session classes does not imply admission to degree candidacy.

Undergraduate Courses

Undergraduate courses are open to undergraduates from UNH and other colleges, to interested members of the community who have a high school diploma or its equivalent or who are at least 18 years of age, and to high school students completing their junior or senior year.

Graduate Courses

Graduate courses are open to UNH graduate students and other individuals with a bachelor's degree from a regionally accredited college or university or its equivalent from a foreign institution.

Other Offerings

Other Summer Session offerings include pre-college programs for high school students; noncredit courses and certificate programs; workshops and seminars for business, industry, and the professions; and residential conferences and special institutes for teachers, other professions, students, and the community.

For More Information

A separate summer catalog is published each year in March and is available from Summer Session, University of New Hampshire, 24 Rosemary Lane, Durham, NH 03824-3529, (603) 862-4234; e-mail to learn.dce@unh.edu; Web site: www.learn.unh.edu

Explanation of Arrangement

The title and arabic number designate the particular course. When two course numbers are connected by a hyphen, the first semester of the course, or its equivalent, is a prerequisite to the second. If the course numbers are separated by a comma, qualified students may take the second semester without having had the first. Course numbers separated by a slash indicate same subject offerings at lower and upper levels.

In courses that are not designated by title as laboratory courses, the notation "Lab" indicates that laboratory sessions are a part of the course.

All courses marked with a # have not been offered in the last three years.

Prerequisites and Corequisites

Each prerequisite for a course is separated from the other prerequisites by a semicolon; e.g., Prereq: EDUC 601; PSYC 635. If permission (of the instructor, department, adviser, or committee) is a prerequisite for all students, it is listed among the prerequisites (e.g., Prereq: EDUC 601; PSYC 635; permission). If, on the other hand, permission may be substituted for one or more of the listed prerequisites, it follows the other prerequisites and is separated from them by a slash mark (e.g., Prereq: EDUC 601; PSYC 635;/or permission). If permission may be substituted for only one of the prerequisite courses, it is listed with the course for which it may be substituted (e.g., Prereq: EDUC 601 or permission; PSYC 635).

Corequisites are courses that must be taken in the same semester.

Credits

The number of credits listed is the number of semester credits each course number will count toward graduation (except in the case of variable credit courses). Students must register for the number of credits shown or, if the course is variable credit, within the range of credits shown.

*See the TSAS bulletin. UNH baccalaureate or associate in arts degree candidates may take 200-level courses for audit only, as the courses do not carry any graduation credit.

Cr/F following the description indicates that no letter grade is given but that the course is graded Credit or Fail.

For up-to-date information about when a course is offered; who teaches the course; the number of recitations, lectures, labs, and such, students are referred to each semester's *Time and Room Schedule*.

The system of numeric designation is as follows:

200–299	Courses in Thompson School of Applied Science.* Full credit only to TSAS degree candidates. Credit may transfer toward other associate and baccalaureate degrees.
300–399	Associate in arts /associate in science courses. Courses may be taken for credit only by associate's degree or nondegree students. Credits may not be applied to baccalaureate degrees.
400–499	Introductory courses not carrying prerequisites and courses generally falling within University and college requirements.
500–599	Intermediate-level courses for undergraduate credit only.
600–699	Advanced-level undergraduate courses. Entrance to courses numbered 600 and above normally requires junior standing.
700–799	Advanced-level undergraduate courses. Ordinarily not open to freshmen and sophomores.
800–999	Courses that carry graduate credit only and therefore are open only to admitted or special graduate students.

Accounting and Finance (ACFI)

(For program description, see page 95.)

Chairperson: Ahmad Etebari
Professors: Ahmad Etebari, John Freear, Fred R. Kaen
Associate Professor: Catherine A. Craycraft
Assistant Professors: Bruce N. Dehning, L Franklin Fant, Jr., Flora G. Guidry, Afshad J. Irani, Douglas E. Stevens

501. Survey of Basic Accounting
Overview of basic financial and managerial accounting concepts and procedures. Fundamentals for the preparation of financial statements and basic budgetary and cost control issues. For nonbusiness administration majors and minors. (No credit for students who have had ACFI 502.) 4 cr.

502. Introductory Financial Accounting
Fundamentals of financial accounting concepts and procedures for analyzing economic events and the preparation and use of financial statements. Freshmen not allowed. (No credit for students who have had ACFI 501 or ADM 532.) 4 cr.

503. Managerial Accounting
The use of information by managers to (1) determine the cost and profitability of the organization's products or services; (2) plan, control, and evaluate routine operations; and (3) make special nonroutine decisions. The demand for managerial accounting information is derived from an integrated treatment of organizational objectives, an orientation to customers, and a focus on activities as the unit of analysis for measurement of cost, quality, and time. Prereq: ACFI 502. Freshmen not allowed. (No credit for students who have had ADM 533.) 4 cr.

601. Financial Management
The investments, financing, and dividend decisions of the firm in a global setting. Topics include capital budgeting, designing and issuing securities, manager performance evaluation, resolution of agency problems, and working capital management. Prereq: WSBE majors only, all Group A courses, and junior standing. 4 cr.

#620. Topics in Finance I
Special topics; may be repeated. Prereq: ACFI 621 or 723 depending on topics and junior standing. 4 cr.

621. Intermediate Financial Accounting I
Examination of the nature and applicability of accounting theory and the conceptual framework of accounting. Development of the capacity to address and resolve issues and problems in financial reporting. Topics include valuation and reporting of current and operating assets, and revenue recognition. Prereq: all Group A courses. 4 cr.

622. Intermediate Financial Accounting II
A continuation of 621. Selected topics within financial reporting such as accounting for investments, leases, pensions, and income taxes. Focus on how and why these issues are accounted for in the manner prescribed by current GAAP. Prereq: ACFI 621. 4 cr.

#640. Topics in Accounting I
Special topics; may be repeated. Prereq: ACFI 601 and junior standing. 4 cr.

701. Financial Policy
Development of analytical tools and practical skills for recognizing and solving complex problems of business finance. Working-capital management, capital budgeting, cost of capital, capital structure, and dividend policy. Prereq: ACFI 601. 4 cr.

702. Investments Analysis
Security valuation, efficient markets, portfolio management, options, and alternative investments. Computer research topics. Prereq: ACFI 601; permission. 4 cr.

703. International Financial Management
Financial management problems facing multinational firms. Primary focus on effects of currency denominations on financial decisions. Prereq: ACFI 601. 4 cr.

704. Derivative Securities and Markets
Derivative assets and markets, and their role in business decision-making and portfolio management. Emphasis on practical and theoretical aspects

of hedging and speculating using futures and options for both commodities and financial assets, including their market mechanics. Prereq: ACFI 601. 4 cr.

720. Topics in Finance II
Special topics. Prereq: ACFI 601 and senior standing. 4 cr.

723. Advanced Managerial Accounting Concepts and Applications
Builds on the basic managerial accounting course by continuing the theme of accounting as a management tool. Emphasis is on cost accounting as a source of data for measuring and improving the economic condition of the enterprise. Newly evolving management themes are integrated into the traditional topics of planning and control, cost analysis, overhead allocation, transfer pricing, and decision modeling. Prereq: all Group A courses. 4 cr.

724. Auditing
Philosophy and environment of auditing, with attention to an understanding of the major auditing concepts and objectives and its judgment process. Emphasis on the nature and economic purpose of audits, standards, professional ethics, auditors' legal liability, internal control, and audit evidence. Includes audit procedures, reports, and computer software. Prereq: ACFI 621. 4 cr.

725. Financial Statement Analysis
Methods and tools of analysis and interpretation of financial statement data. Use of financial information in a variety of decision making situations including prediction of corporate earnings, debt ratings, and financial distress; lending decisions; risk analysis; and equity valuations. Prereq: ACFI 621, all Group B courses, and senior standing. 4 cr.

726. Taxation and Management Strategy
Taxation factors relevant to business decisions. Taxable income and deductions, passive activities, alternative minimum tax, property transactions, deferred compensation, and corporate and partnership taxes. Prereq: ACFI 601. 4 cr.

#740. Topics in Accounting II
Special topics. Prereq: ACFI 621 or 723, depending on topics, and senior standing. 4 cr.

750. Internships in Accounting
Accounting fieldwork in a business or other type of organization. Supervision provided by the organization, and consultation provided by the faculty sponsor. Written report required. Course credits vary according to the nature of the fieldwork, to be determined by the faculty sponsor. Prereq: seniors in high standing; permission. 1–4 cr. Cr/F.

751. Internships in Finance
Finance fieldwork in a business or other type of organization. Supervision provided by the organization, and consultation provided by the faculty sponsor. Written report required. Course credits vary according to the nature of the fieldwork, to be determined by the faculty sponsor. Prereq: seniors in high standing; permission. 1–4 cr. Cr/F.

#752. Independent Studies in Accounting
Student-designed individual research projects, approved by a faculty sponsor. Paper required. Course credits vary according to the nature of the project, to be determined by the faculty sponsor. Prereq: seniors in high standing; permission. 1–4 cr.

#753. Independent Studies in Finance
Student-designed individual research projects, approved by a faculty sponsor. Paper required. Course credits vary according to the nature of the project, to be determined by the faculty sponsor. Prereq: seniors in high standing; permission. 1–4 cr.

#754. Honors Seminar in Accounting and Finance
Seminar discussions of advanced readings in accounting and finance. For seniors with standing in the honors program. 4 cr.

Adult and Occupational Education (AOE)

Department of Resource Economics and Development

(For program description, see page 81.)

Coordinator: David L. Howell
Professor: David L. Howell
Thompson School Professor: Thomas A. March
Associate Professors: Patricia D. Bedker, Lewis Roberts, Jr.

440. Concepts of Career Exploration
Examines the four major roles of people (as family members, students, workers, and users of leisure time) and how these roles apply to (1) achieving a balanced life; (2) exploring individual areas for improvement; (3) relating present and future classes to entering the world of work; and (4) developing flexibility for changes that may occur in the future. Special fee. 4 cr.

500. Occupational Competency Examination and Evaluation
Examination and/or evaluation to determine the level of competency within an occupation. Restricted to adult and occupational education majors. Prereq: permission. Special fee. 0–30 cr. Cr/F.

#510. Leadership Techniques in Diverse Populations
Analysis of various historical theories and styles of leadership; characteristics of groups, group dynamics, and conflict resolution. Methods used in planning and conducting effective meetings. Methods of group problem solving and decision making. Analysis of leadership styles in diverse situations. 4 cr.

630. Development of Food and Fiber in Third World Countries
The world food situation and the role of agriculture and education in development of third world agrarian systems. Identification of constraints on food production, technology transfer, advantages and disadvantages of different agriculture systems, agricultural marketing, and career opportunities in international agriculture. 4 cr.

650. Microcommunications
Organization, presentation, and evaluation of microlessons in a variety of educational settings. Preliminary experience and practice in communications. Variables of communicating under controlled conditions with videotaping for immediate feedback. Required for majors and minors. Special fee. Writing intensive. 4 cr.

695. Investigations in Adult and Occupational Education
Topics may include career education, secondary education, postsecondary education, adult education, extension education, exemplary education, cooperative education, disadvantaged and handicapped education, or teaching experience. An opportunity for undergraduate students to address a special problem. Prereq: permission. May be repeated. 2–4 cr. Cr/F.

696. Field Experience
Work with an agency, institution, or organization to gain technical and/or professional competence not otherwise available. Student plans experience with departmental adviser. Credit approval subject to recommendation of faculty members and performance of student. Prereq: permission. 2–16 cr.

700. Workshops in Adult and Occupational Education
Modularized instruction of in-service education. Focus varies with the needs of the student. May be repeated up to 8 credits. 1–4 cr.

702. Concepts of Adult and Occupational Education
Development of occupational education in the U.S.; socioeconomic influences responsible for its establishment; federal and state requirements for secondary and postsecondary schools. Coordination of programs with general education and vocational fields. Focus on selected concepts relevant to adult education. Special attention on the adult as a learner, volunteer management, evaluation and accountability, experiential learning, and adult education. Required of all degree candidates in AOE concentrations. Writing intensive. 4 cr.

752. Youth Organizations
Organizational Development (advising youth organizations; teaching parliamentary procedure; developing programs and activities; leadership).

FFA/SAEP (Future Farmers of America/Supervised Agricultural Experience Programs, for high school youth).

VICA (Vocational Industrial Clubs of America).

4–H (Cooperative Extension Youth Program). 4 cr.

#753. Volunteer Program Development/Administration
Principles of involving volunteers in programs. Application of theories of adult education and adult development to the planning and administration of programs that use volunteers. 3 cr.

#783. Conducting and Supervising Adult Education Programs
Analysis of traditional and nontraditional adult education programs; development of strategies of program planning, instruction, evaluation, and supervision. 4 cr.

#784. Experiential Adult Learning
Theory, development, and applications of experientially based educational programming especially in relation to adult learning styles. Major emphasis placed on student-directed simulations, jour-

nals, facilitation, experiential reflection, and group activities. 4 cr.

791. Planning for Teaching
Organization of materials of instruction to meet group and individual needs. Techniques of instruction, planning for teaching, function of consulting committees, working with youth groups, program evaluation. Course scheduled concurrently with EDUC 694. Prereq: Microcommunciations or permission. 4 cr.

796. Investigations in Adult and Occupational Education
Topics may include career education, secondary education, postsecondary education, adult education, extension education, exemplary education, cooperative education, disadvantaged and handicapped education, international agriculture, or teaching experience. Student-selected problems in one of the areas listed. Elective after consultation with instructor. Hours arranged. May be repeated. 1–4 cr.

Agricultural Mechanization

451. Welding and Fabrication Technology
Processes and procedures of welding (arc, oxyacetylene, gas metal arc, gas tungsten arc) and metal fabrication. Lab. 3 cr.

461. Internal Combustion Engines, Principles and Maintenance
Internal combustion engines and their components with emphasis on how they function, preventive maintenance, and troubleshooting. Prereq: permission. Lab. 3 cr.

462. Internal Combustion Engines, Repair and Overhaul
Principles and techniques of engine overhaul. Each student is required to provide and overhaul, to factory specifications, at least one 4-stroke cycle engine. Prereq: Internal Combustion Engines, Principles and Maintenance; permission. Lab. 3 cr.

470. Residential Electricity
Electrical principles, laws, and installation with emphasis on the National Electrical Code. Lab. 3 cr.

475. Construction Methods and Materials
The materials and methodology of building construction with an emphasis on building science. Prereq: permission. Special fee. Lab. 4 cr.

Aerospace Studies (AERO), Reserve Officer Training Corps

(For program description, see page 109.)

Professor: Lt. Col. Lee W. Sheedy
Assistant Professors: Major Paul N. Fecteau, Capt. Ramona G. Tate

301. Leadership Laboratory
Taken by all AFROTC cadets throughout enrollment in AFROTC. Command and staff leadership experiences in cadet corps. Air Force customs and courtesies, drill and ceremonies, career opportunities, and life and work of the junior officer. Student leadership potential developed in a practical, supervised laboratory. 0 cr.

415. Foundation of the USAF I
Mission and organization of today's Air Force as an instrument of the U.S. national defense policy. Customs and courtesies, officership, and communication foundations are discussed. 1 cr.

416. Foundation of the USAF II
Air Force installations, fundamentals of Air Force written and verbal communication, and current events of interest to Air Force Officers are discussed. 1 cr.

541. Evolution of USAF Air and Space Power I
The nature of warfare; development of air power from balloons and dirigibles through World War II. 1 cr.

542. Evolution of USAF Air and Space Power II
Development of air power from post–World War II through the peaceful use of air power in Berlin; the Cuban crisis; air war in Southeast Asia; and research and development of present and future aerospace vehicles. 1 cr.

671. Air Force Leadership Studies I
An integrated management course emphasizing the individual as an officer/leader in the Air Force. Motivation and behavior, leadership, communication, group dynamics, and decision making in a changing environment. Air Force cases studied. 4 cr.

672. Air Force Leadership Studies II
Organizational and personal values; management of forces in change; organizational power, politics, managerial strategy, quality, and tactics; Air Force cases studied. 4 cr.

681. National Security Affairs I
Focus on the armed forces as part of American society, emphasizing civil-military relations in context of U.S. policy formulation and implementation. Requirements for adequate national security forces; political, economic, and social constraints on the national defense structure; impact of technological and international developments on strategic preparedness; the variables involved in the formulation and implementation of national security policy. 4 cr.

682. National Security Affairs II
Focus on attitudes toward the military, socialization processes, role of the professional military leader-manager, and military justice and administrative law. 4 cr.

695. Officer Internship (Air Force)
Experiential learning through class and field work in a military environment. Written analysis required. Prereq: AERO 671 (may be taken concurrently). Permission of department chair required. For AFROTC cadets only. 4 cr. Cr/F

American Studies (AMST)

(For program description, see page 27.)

Coordinator: Lisa Watt MacFarlane

501. Introduction to American Studies
An introduction to the basic methods used in the interdisciplinary study of history, literature, the arts, and other aspects of life and culture in the United States. Disciplinary approaches drawn from literature, history, art history, architecture, film, anthropology, sociology, etc. Required for students minoring in American studies. 4 cr.

502. Introduction to African American Literature and Culture
An introduction to African-American literature in the context of a variety of cultural perspectives. Course topics may include: major writers, literary genres, historical periods, Harlem Renaissance, Black Arts Movement, fine and folk arts, religion, music, and film. Writing intensive.(Also offered as ENGL 517.) 4 cr.

603. Photography and American Culture
Interdisciplinary study of the relationship between photography and the literature, art, politics, and history of the nineteenth and twentieth centuries. Introduces theories of photography as well as works of individual artists. Topics vary from year to year. 4 cr.

604. Landscape and American Culture
Interdisciplinary study of the perception, representation, and/or construction of nature. Topics vary from year to year and may include: landscapes in nineteenth-century literature and art, colonial mapping of the Americas (traditions of writing and cartography), Native Amer ican traditions of land perception, and the twentieth-century emergence of ecocriticism. 4 cr.

605. Film in American Culture
Advanced, focused study of American cinema. Topics vary from year to year and with instructor. Focus may range from general consideration of American film history, theory, and criticism, to specific analyses of selected types of American cinema: "classical" Hollywood, "new" Hollywood, and "alternatives," to specific periods, movements, genres, and film-makers. Prereq: ENGL 533, or CMN 550, or permission. Special fee. 4 cr.

607. Religion in American Life and Thought
Interdisciplinary study of the varied nature of American religious experience and its relationship to other aspects of American culture. Topics vary from year to year, and may include, for example: the interdisciplinary study of a spiritual community, African American religious history, material culture and spiritual expression, politics and religious free speech, religious culture in the nineteenth century, multi-ethnic American religions and literature. 4 cr.

608. Women Artists and Writers 1850–Present
Studies the impact of gender on the lives and works of selected American artists. Considers lesser-known figures such as Fannie Fern, Lily Martin Spencer, and Mary Hallock Foote as well as better-known artists such as Willa Cather and Georgia O'Keefe. Prereq: permission or one of the follow-

ing: WS 401, HIST 566, ENGL 585, 586, 685, 785, or a 600-level art history course. Writing intensive. (Also offered as ARTS 608, ENGL 608, and HIST 608.) 4 cr. Not offered every year.

609. The African American Experience in the Twentieth Century
Investigates the music, literature and social history of African American America in the period of the Harlem Renaissance, in the Great Depression, World War II, and in the 1960's. Special attention to the theme of accommodation with and rejection of dominant white culture. Writing intensive. (Also offered as ENGL 609, HUMA 609, and MUSI 609.) 4 cr.

610. New England Culture
An interdisciplinary course investigating some of the major contributions New England has made to American life. The course focuses on periods, such as the Puritan era (1620–90), the Transcendentalist period (1830–1860), late nineteenth-century industrialism, and the contemporary era. New England places are also featured such as Boston, Newport, Salem, the Connecticut River Valley, and rural northern New England. Course materials are drawn from the fields of literature, history, art history, and material culture. 4 cr.

612. Periods in American Culture
Intensive multidisciplinary study of the art, literature, material culture, and the social, political, and cultural movements of a specific period in the American past. Periods vary from year to year. Examples: the 1890's, the 1690's, the 1770's, the 1950's. May be repeated for credit if subject matter is different. 4 cr.

696. Special Topics in American Studies
Focused study of an issue, problem, or theme in American Studies. Topics vary. For example: Black Protest in the 1960's, the rise of consumer culture, domestic art, architecture and suburban planning. Barring duplication of subject, course may be repeated for credit. For details see the coordinator. Prereq: AMST 501, and another AMST course, or permission. 4 cr.

697/8. Seminar in American Studies
Open to qualified juniors and seniors, with permission of the coordinator and the instructor. Intensive study of a specialized topic that varies from year to year. Enrollment in the seminar is limited to 15 so that all students can take an active part in the discussion and work closely with the instructor on their papers. Barring duplication of subject, course may be repeated for credit. For details, see the coordinator. Prereq: a grade of B or better in AMST 501, completion of at least two other courses in the minor, permission. 4 cr. Not offered every year.

795/796. Independent Study
Open to qualified juniors and seniors. May include fieldwork or an internship at a museum, library, historical society, etc. To be elected only with permission of the coordinator and with qualified supervision. May be repeated up to 8 cr.

Animal Sciences (ANSC)

Department of Animal and Nutritional Sciences
(For program description, see page 82. For Dairy Management description, see page 85. For courses in Nutritional Sciences, see page 193.)

Chairperson: William E. Berndtson
Professors: William E. Berndtson, William A. Condon, Thomas P. Fairchild, Thomas L. Foxall, Charles G. Schwab, Samuel C. Smith, Robert L. Taylor, Jr.
Adjunct Professor: Robert J. Nicolosi
Associate Professors: Patricia D. Bedker, Elizabeth P. Boulton, Paul C. Tsang
Adjunct Associate Professor: Arthur F. Stucchi
Assistant Professors: Janet C. Briggs, Peter S. Erickson, David H. Townson
Adjunct Assistant Professors: Gerard Beekman, Larry Bush, Paul F. Cotter, Eugene J. Rogers
Instructor: Elizabeth C. Smith
Senior Veterinary Pathologists: Carroll J. Jones, Roger E. Wells
Teacher/Trainer: Amy S. Dickens
Director of Preveterinary Programs: Joseph J. Moore

400/400W. Food and People
Survey of nutritional and food sciences emphasizing the biological significance of food. 400W is writing intensive. Special fee. 4 cr.

401. Animals and Society
Contributions of animals to human society are considered within the context of contemporary practices and issues associated with the use of animals in agricultural production, as human companions, and in agricultural and biomedical research. Special fee. Lab. 4 cr.

402. Horsemanship
For beginning, intermediate, and advanced riders. Basics of balance seat, specializing in basic dressage and combined training. Limited number of students may stable their horses at the University. Special fee. May be repeated for a maximum of 15 credits. Lab. Prereq: permission. 3 cr.

403. Summer Horsemanship
For beginning and intermediate riders. Basics of balance seat, specializing in basic dressage and combined training. There is no lecture with this summer course. Limited number of students may stable their horses at the University. Special fee. May be repeated for a maximum of 18 credits. Prereq: permission. Special fee. 1 cr.

404. Introductory Equine Science
Study of the horse industry encompassing nutrition, genetics, breeds, selection procedures, and health maintenance. Special fee. Lab. 4 cr.

405. Food and Society
Consideration of the cultural significance of food, emphasizing historical, psychological, social, political, and economic aspects. Writing intensive. (Also offered as NUTR 405.) 4 cr.

406. Careers in Animal Science
Survey of various areas of animal and veterinary science and opportunities available. 1 cr. Cr/F.

432. Animal Forages
Production and utilization of New England forage crops. Selection of species and varieties; cultural and harvesting practices for top production of excellent quality. Combining uses for greatest efficiency in feeding various livestock classes. Lab. 3 cr.

504. Introductory Meats
Selection of meats for quality and economy. Study of wholesale cuts, retail cuts, and grading systems. Pricing of meats as affected by shrinkage and customer demand. Quality control as it affects shelf life of meats. Lab. 3 cr.

507. The Scientific Approach to Equine Discipline
Physiological development, control, and education; bitting, lunging, driving, and equine gymnastics. Prereq: ANSC 402; permission. Special fee. Lab. 3 cr.

508. Dairy Production Techniques
Practical experience in dairy husbandry techniques. Only for students with no previous experience in dairy husbandry. Prereq: permission. 2 cr. Cr/F.

511-512. Anatomy and Physiology
Introduction to the principles of human structure and function. Includes molecular and cellular mechanisms of major processes (such as muscle contraction, neural transmission, and signal transduction) and systematic aspects of the nervous, cardiovascular, respiratory, endocrine, gastrointestinal, and renal systems. Structure of the above systems will be covered at both the microscopic and macroscopic levels. Prereq: CHEM 403-404. Special fee. Lab. No credit if credit earned for ZOOL 507-508; ZOOL 518 and ZOOL 625. Not open to freshmen. 4 cr.

552. Introductory Dairy Herd Management
Economic principles and management factors involved in successful dairy herd management. Criteria for success, record keeping, applied genetics, housing, materials handling, feeding, and health care are topics covered. 3 cr. (Not offered every year.)

554. Introductory Dairy Herd Management Lab
Practical study of various aspects of dairy herd management. Farm visits and case studies will be involved. Should be taken concurrently with ANSC 552. 1 cr. (Not offered every year.)

600. Field Experience
A supervised experience providing the opportunity to apply academic experience in settings associated with future professional employment and/or related graduate opportunities. Must be approved by a faculty adviser selected by the student. May be repeated to a maximum of 8 credit hours. Permission of supervising faculty member required. 1–4 cr. Cr/F.

602. Animal Rights and Societal Issues
To explore all aspects of human-animal interaction and welfare, emphasizing social, ethical, biological, historical, and economic aspects of animal care and use. Writing intensive. (Juniors and seniors only.) Special fee. 4 cr.

603. Dairy Cattle Selection
Principles of selecting dairy cattle based on performance, pedigree analysis, progeny testing, and type evaluation. Lab. 2 cr.

604. Light Horse Selection
Principles of selecting light horses based on performance, pedigree, progeny records, and type evaluation. Lab. 2 cr.

607. Small Animal Diseases
Common diseases in companion animals; emphasis on canine and feline medicine. 2 cr.

609. Principles of Nutrition
Applied animal nutrition and nutrient metabolism. Prereq: one year of chemistry; one semester of physiology. Special fee. 4 cr.

612. Genetics of Domestic Animals
Application of Mendelian principles to traits of domestic animals with particular emphasis on economically important traits of farm animals. Principles of population and quantitative genetics are introduced. Topics include sex linkage, Hardy-Weinberg Law, meiosis, elementary statistics, genetic relationships, and heritability. Lab. 4 cr.

620. Equine Diseases
Body-systems approach to the discussion of medical and surgical diseases affecting the horse. Prereq: ANSC 404. 2 cr.

622. Equine Disease Clinic
Evaluation techniques of the normal and abnormal horse using the University horse herd. Discussion of clinical cases within the herd. Prereq: ANSC 404; coreq: ANSC 620. 2 cr.

623. Comparative Histology
Introduction to microscopic anatomy of domestic animal tissues and body systems with reference to human, avian, fish, and marine mammals. Structure and function briefly correlated. Prereq: ANSC 511-512 or permission. Special fee. 4 cr. Recommended for all premed, prevet, and predental students.

625. Equine Sports Medicine and Lameness
Limitations of the healthy horse in athletic competition and the prevention and treatment of equine athletic injuries with heavy emphasis on the musculoskeletal system. Prereq: ANSC 404; ANSC 511-512; permission. Special fee. 4 cr.

626. Cell Physiology
Advanced study of the physiological processes characteristic of mammalian cells, and the biochemical/biophysical components that control cell homeostasis and function. Emphasis will be placed upon transmembrane transport mechanisms, cell communication and signal transduction, adhesion and contractility mechanisms, metabolism, and the organization of the interacellular milieu. Prereq: BIOL 411 or ZOOL 507/508 or ZOOL 625; permission. Maximum enrollment of 50 students. 4 cr.

630. Dairy Cattle Diseases
Covers the principles of immune response, disease development, immunological basis for disease control, management practices to maintain animal health, and dairy cattle disease identification and prevention. 2 cr.

650. Dairy Industry Travel Course
Extended field trip to a variety of dairy farms and dairy related businesses in the Northeast with students and faculty from other New England land grants. Includes discussion sessions, case study, problem solving, and journal report. Prereq: permission. May be repeated to a maximum of 2 credits. 1 cr.

653-654. Principles of Teaching Equitation
Teaching techniques and procedures, with emphasis on dressage; opportunity to teach riding theory and techniques to other students under supervision of instructor. Teaching certificate awarded to students successfully completing course. Prereq: ANSC 402 and 507; permission. Special fee. Lab. A year-long course; 4 cr. each semester, 8 cr. total, an IA grade (continuous course) given at the end of first semester. Withdrawal from course results in loss of credit.

695-696. Supervised Teaching Experience
Participants are expected to perform such functions as leading discussion sections, directing and assisting in laboratories, and assisting students with their problems in courses that participants have completed successfully. Enrollment is limited to juniors and seniors who have a minimum 3.00 cumulative average. May be repeated up to a maximum of 4 credits. Prereq: permission of instructor and department chairperson. 1–2 cr. Cr/F.

697. Equine Seminar
Current equine industry issues, recent literature and research, and professional preparation. Offered to sophomores and juniors only. 1 cr. Cr/F.

698. Cooperative for Real Education in Agricultural Management (CREAM)
CREAM (Cooperative for Real Education in Agricultural Management) is a 2 semester course in which students perform the work and make the financial and management decisions associated with the CREAM dairy herd. Students assume complete responsibility for the management and care of the 25-cow herd for the entire academic year. CREAM provides students with a unique experiential learning model that will help them understand how to work together to manage and operate a small business, the decision-making skills required in production agriculture and the application of science to the management of a dairy herd. Permission. Two semesters of 4 cr. each are required.

701. Physiology of Reproduction
Comparative aspects of embryology, anatomy, endocrinology, and physiology of reproduction. Special fee. Lab. 4 cr.

702 Endocrinology
Structure and function of vertebrate endocrine systems. Influence of endocrine system on the molecular and biochemical mechanisms and physiology of vertebrates, with special reference to mammals. Current investigations of the endocrine system as a regulator and integrator of body functions including such systems as growth, reproduction, metabolism, differentiation, and behavior. Prereq: BCHM 658 or 751; or permission. (Also offered as BCHM 702.) 4 cr.

#704. Principles of Pathobiology
Principles of disease processes; reactivity of the diseased cell, tissue, and organ. Prereq: ANSC 511-512 or permission. 3 cr.

708. Ruminology
Anatomy of the ruminant gastrointestinal tract, physiological factors related to rumen function, and microbial metabolism of carbohydrates, protein, and lipids. Prereq: MICR 503 or equivalent. 2 cr.

710. Dairy Nutrition
Feeding management of dairy cattle. Emphasis on feedstuffs, nutritional requirements, and diet formulation for efficient production and optimum health. Prereq: ANSC 609; permission. Coreq: ANSC 708. 2 cr.

714. Research Methods in Endocrinology
Principles of biochemical, cellular and molecular techniques and their applications to research in the endocrine system. Techniques include protein and nucleic acid assays, thin layer chromatography, radioimmunoassay, enzyme-linked immunosorbent assay, agarose and polyacrylamide gel electrophoresis, transfection, restriction analysis, plasmid amplification, RNA extraction, and dot-blot hybridization. Prereq: ANSC 701 or BCHM 658 or ANSC 702/BCHM 702; permission. Special fee. Lab. Writing intensive. 5 cr.

715. Physiology of Lactation
Examines the biological and biochemical influences of the lactation process. Emphasis on the physiological effects of environments, hormones, and nutrition on milk synthesis and secretion, mammary physiology, and maternal response. Prereq: ANSC 701, permission. 4 cr.

718. Mammalian Physiology
Advanced study of the systems that control mammalian functions with emphasis on cellular and molecular mechanisms. Includes the nervous, muscular, cardiovascular, renal, gastrointestinal, and endocrine systems. Prereq: ANSC 511-512; ZOOL 627 and one semester of biochemistry or permission. 4 cr.

#720. Public Health Nutrition
Focus on managerial processes of planning, leading, and evaluating community nutrition programs and the skills and tools needed to develop and present such programs. (Also offered as NUTR 720.) 4 cr. (Not offered every year.)

#722. Immunogenetics
Cellular interactions leading to immune regulatory mechanisms. Emphasis is placed on the major histocompatibility complex, immune responses, and antibody diversity. (Also offered as GEN 722.) Lab. 4 cr. (Offered alternate years.)

724. Reproductive Management and Artificial Insemination
Focus on goals and fundamentals of reproductive management of horses, dairy and livestock animals, and, through actual experience, development of competency in performing modern breeding techniques for equine and bovine reproduction. Prereq: ANSC 701; permission. Special fee. Lab. 4 cr.

727. Advanced Dairy Management I
Advanced management evaluation of milking procedures, reproduction, genetics, herd health, feeding, housing, and milking systems. Prereq: junior or senior standing; permission. 4 cr.

728. Advanced Dairy Management II
Advanced management evaluation of record keeping, financial and business management, personnel management, waste management and marketing. Prereq: junior or senior standing; permission. 4 cr.

743. Technical Writing in Dairy Management
Emphasis on writing scientific articles and articles for the end user on subjects pertaining to the dairy industry. Students are also expected to make several oral presentations. Résumé preparation is also included. Prereq: senior standing; permission. 2 cr.

746. Animal Cell Culture
Theory and principles fundamental to the culture of animal cells in vitro. Introduction to techniques of preparation and maintenance of animal cell cultures. Application of cell culture to contemporary research in the biological sciences. Special fee. Lab. 4 cr.

750/750W. Nutritional Biochemistry
Detailed analysis of the digestion, absorption, transport, and intermediary metabolism of nutrients. Nutrient requirements are evaluated in the context of their physiological and biochemical functions. Prereq: ANSC 511-512; BCHM 658; or equivalents. (Also offered as NUTR 750.) 750W is writing intensive. Special fee. 4 cr. (Fall semester only.)

751. Cell Culture
Principles and technical skills fundamental to the culture of animal and plant cells, tissues, and organs. Introduction to the techniques of subculturing, establishing primary cultures, karyotyping, serum testing, cloning, growth curves, cryopreservation, hybridoma formation and monoclonal antibody production, and organ cultures. An interdisciplinary course with emphasis on the application of cell culture to contemporary research in the biological sciences. Prereq: MICR 503; permission. (Also offered as MICR 751 and PBIO 751.) Special fee. Lab. 5 cr.

752. Mammalian Cell Culture
Basic concepts and techniques associated with the cultivation of mammalian cells in vitro, including media preparation, cell viability, transfer, cloning, cryopreservation; use of transformed cell harboring cloning vectors for production of bioproducts. (No credit if already taken MICR 751.) Prereq: MICR 503. (Also offered as MICR 752.) Special fee. Lab. 5 cr.

760. Geriatric Nutrition
Emphasis on the nutritional requirements and status of the elderly in view of psychological and physiological changes in aging. Approaches for nutrition intervention and support will be addressed. Prereq: NUTR 400 and 499 or permission. (Also offered as NUTR 760.) 3 cr., Cr./F. (Summer session only.)

#773. Clinical Nutrition
Application of principles of normal nutrition and physiology to clinical problems; altered nutrient requirements in human disease. Prereq: basic nutrition and biochemistry or permission. Coreq: ANSC 775. (Also offered as NUTR 773.) 4 cr. (Fall semester only.)

#775. Practical Applications in Therapeutic Nutrition
Supervised practical experience in therapeutic dietetics in one of several cooperating New Hampshire hospitals. Emphasis on nutritional counseling, assessment, and instruction of patients with nutrition-related disorders. Coreq: ANSC 773. (Also offered as NUTR 775.) 3 cr. (Fall semester only.)

#780. Critical Issues in Nutrition
Critical review and analysis of controversial topics in nutrition; emphasis on developing oral and written communication skills and analytical reasoning skills. Prereq: permission. (Also offered as NUTR 780.) 4 cr. (Spring semester only.)

796. Investigations in Animal Sciences
Problems in genetics, nutrition, management, diseases, histology, equestrian management, equine agribusiness management, physiology, cell biology, microbiology, dairy management, or teaching experience. May be repeated. Prereq: permission. 1–4 cr.

798. Contemporary Topics in Biomedical Science and Nutrition
Lecture-discussion series on topics in animal biology, nutrition, and medicine including production and applications of monoclonal antibodies; oncogenesis; sports nutrition; nutrition and cancer; toxicology; atherogenesis. May be repeated. Prereq: permission. 2 cr.

799. Honors Thesis
Independent research culminating with a written honors thesis in: A) Genetics; B) Nutrition; C) Management; D) Diseases; E) Histology; F) Light Horsemanship; G) Physiology; H) Cell Biology; I) Microbiology; J) Dairy Management. May be repeated. Prereq: permission. 1–4 cr. IA

Anthropology (ANTH)

Department of Sociology and Anthropology
(For program description, see page 31.)

Chairperson: Barbara K. Larson
Professor: Stephen P. Reyna
Associate Professors: Charles E. Bolian, Barbara K. Larson, Joe L.P. Lugalla, Nina Glick Schiller, Deborah Winslow
Faculty-in-Residence, Assistant Professors: Jaime J. Awe, David E. Sutton

411/411W. Cultural and Social Anthropology
Cultural and social aspects of human behavior, particularly in relation to nonindustrial societies. Analysis of selected societies, institutions, and forms of social structure. 411W is writing intensive. 4 cr.

412. Physical Anthropology and Prehistoric Archaeology
Human physical evolution and cultural prehistory; evolutionary theory and archaeological techniques. 4 cr.

500/500W. Peoples and Cultures of the World
A) North America; B) South America; C) Middle East and North Africa; D) Sub-Saharan Africa; E) South Asia; F) Southeast Asia; G) Oceania; Z) Other. Characteristic ecological, historical, and sociocultural factors in the major ethnographic regions of the globe. Analysis of selected societies and institutions. Offered in the following sections as staff is available and student needs dictate. **North America**: Study of the economy, society, religion, art, and ideas of North American Indians from precolonial times to the present. **South America**: A survey of the indigenous cultures and selected studies of the relationship between environment and culture. Changes in culture and social organization since the 16th century will be considered where historical data permit. **Middle East and North Africa**: The role of ecological, social, cultural, and historical factors in shaping Middle Eastern and North African culture today. Special attention will be paid to family, values, and religion; to nomadic, village, and urban ways of life; and to issues of unity, diversity, colonialism, and culture change. **Sub-Saharan Africa**: Study of Sub-Saharan economy, society, and culture from precolonial times to the present. **South Asia**: Emphasis on India, Sri Lanka, and Nepal. Traditional and changing South Asian cultures, including caste, family, economy, and religious traditions of Hinduism and Buddhism. **Southeast Asia**: Geographical, historical, ethnic, and sociocultural factors characteristic of the region. Impact of Indian, Chinese, Islamic, and European civilizations. Analysis of selected indigenous social, political, economic, and religious institutions. **Oceania**: Study of the economy, society, religion, art, and ideology of Pacific Island cultures from precolonial times to the present. 500W is writing intensive. 4 cr.

501. World Prehistory
A) North America; B) Mesoamerica; C) South America; D) Near East; E) Other. The development of prehistoric culture in various areas of the world. Offered in the following sections as staff is available and student needs dictate. **North America**: Archaeology of the Indians north of Mexico from earliest evidence of settlement to European contact. Diversity of cultures from ecological and evolutionary perspectives. Emphasis on the Eastern Woodlands, the Plains, and the Southwest. **Mesoamerica**: Cultural development from earliest cultures through the Spanish conquest. Emphasis on origins of agriculture and rise of Olmec, Teotihuacan, Mayan, Toltec, and Aztec civilizations. Stress on factors critical to the development of complex societies. **South America**: Cultural development from earliest migrations through Inca Empire. Focus on major regions of South America. Consideration of Intermediate Area, Amazon Basin, and Central Andes as core regions for foundations of civilization. **Near East**: From earliest cultures to the development of agriculture and settled village life. Examines the processes that gave rise to the world's first civilizations. 4 cr.

512. Introduction to World Ethnography
Primarily for majors and minors, but open to all students. Historical and geographic factors, types of social and economic organization, and problems involved in the comparative study of human societies and institutions. Analysis of selected peoples in the major ethnographic areas. 4 cr.

514. Method and Theory in Archaeology
Basic method and theory; techniques in recovering and interpreting data; laboratory exercises in ceramic and lithic analysis. Critical evaluation of archaeological literature. Prereq: ANTH 412 or permission. 4 cr.

515. Anthropology and Contemporary Issues
Anthropological approaches to current world issues such as racism, poverty, religious movements, revolution, and environmental stress. Selected topics examined in the context of both western and nonwestern societies. 4 cr.

516. Kinship and Social Organization
The significance of kin and nonkin relations in human societies. Topics include the origins and evolution of human society, variations in the form and functions of marriage, family, and kin-based groups and selected nonkin relationships. Primary focus will be on nonindustrial societies. Prereq: ANTH 411 or permission. 4 cr.

#517. Introduction to Anthropological Analysis
Basic skills of reading, writing, and analysis essential to the study of anthropology. Focus on learning to recognize, compare, and evaluate critically the central arguments of several major books drawn from different subfields and orientations in anthropology. Small class size for extensive discussion and feedback. Prereq: ANTH 411 or 412;/or permission. Writing intensive. 4 cr.

518. History of Anthropological Theory
Reading and discussion of the works of major theoreticians of American, British, and French schools. Selections from the works of Spencer, Morgan, Tylor, Boas, Kroeber, Lowie, Steward, White, Durkheim, Mauss, Lévi-Strauss, Malinowski, Radcliffe-Brown, Evans-Pritchard, and others are treated in terms of their contributions to the historical development of anthropology and their relevance to contemporary debates in anthropological theory. 4 cr.

519. Social Change and Development: An Anthropological Perspective
Extraordinary growth of European and American economic and political power since 1450. Major social, cultural, and economic changes resulting from this growth, described from the anthropological literature for the developing world. Existing theories reviewed in terms of their ability to explain these changes. 4 cr.

520. The Anthropology of Migration
The question of immigration, an issue of great concern throughout the world, is addressed along with the movement of people as a historical, economic and cultural process. Life experiences of people in motion are examined. Using case studies, past and present migrations are compared. The racial, ethnic, and national identities of migrants are explored. Distinctions between immigrants, refugees, sojourners, internal and international migration, and legal and undocumented migrants, as well as the history and current status of attacks on immigrants are critiqued. While most of the course material is drawn from the U.S. experience, the perspective on migration is global. 4 cr.

600. Issues in Contemporary Anthropological Theory
Explores such recent directions in the discipline as cognitive/symbolic anthropology, cultural materialism, evolutionary theory, gender studies, interpretive anthropology, political economy, practice theory, and structuralism. Prereq: ANTH 518 or permission. 4 cr.

610. Medical Anthropology: Illness and Healing
How we as humans define sickness and health, our theories of who or what made us ill, our approach to biological processes from birth to death and our search for cures have varied through history and from culture to culture. This course provides an overview of illness and healing beliefs and practices in different cultures both around the world and in the United States. The course examines the practices and belief systems of healers, vodun priestesses, midwives, Taoist priests, psychiatrists and medical doctors through the same analytical lens. 4 cr.

614. Economic Anthropology
Economics of nonindustrial societies; definition of economics; production, distribution, and consumption in selected societies; development. Prereq: ANTH 411 or permission. Writing intensive. 4 cr.

616. Religion, Culture, and Society
Major anthropological theories of religion; analysis of religious beliefs as symbolic systems and their interrelations with ritual and other social institutions. Detailed study of specific religions. 4 cr.

618. Political Anthropology
Political processes and structures in nonindustrial societies. Major topics: centralization of power and authority, legal systems, and warfare. Prereq: ANTH 411 or permission. 4 cr.

625. Female, Male, and Society
Critical, cross-cultural study of sex-related behavior in historical as well as contemporary perspective. Draws on anthropological, social-psychological, and sociological literature. (Also offered as SOC 625.) 4 cr.

#626. Women in the Middle East
Explores the diversity of women's lives in the Middle East and North Africa. Among the themes addressed are: national, regional, class and ethnic variations; the effects of differing ecological adaptations (rural, urban, and nomad) on gender roles; the underlying cultural and religious values that affect gender relations in this part of the world, and the social, ecological, economic, and political factors which shape how those values are enacted in every day life. Also examines women's active participation in contemporary movements such as feminism, nationalism, and Islamic fundamentalism, as well as their roles in periods of national, radical, or revolutionary ferment. 4 cr.

627. Urbanization in Africa
Explores the process of urbanization and describes the creation of urban culture in sub-Saharan Africa by investigating the effects of urbanization on socio-economic and cultural conditions. An attempt is made throughout the course to study urbanization and urban life within the context of broader societal, economic, cultural, and political relations in order to understand the dynamics inherent in these processes. Urbanization discussed in the context of colonialism, postcolonialism, and other social relations of dependency that continue to shape urban life and urban-rural relations. 4 cr.

630. Anthropological Field Research
Explores in theory and practice a range of approaches to doing field studies in anthropology. Techniques such as life histories, questionnaires, projective tests, participant observation, and field diaries are explored in class and through active participation in a class research project. Prereq: ANTH 411; one 500-level or higher anthropology course;/or permission. Writing intensive. 4 cr.

650. Field School in Archaeology
Field and laboratory methods in archaeology. Emphasis on excavation techniques and data analysis as related to project research design. Includes practical experience in lab as well as field. Prereq: permission. Special fee. 4–8 cr.

697. Special Topics in Anthropology
Occasional or experimental offerings. May be repeated for different topics. Prereq: ANTH 411 or permission. 4 cr.

698. Folklore and Folklife
Examines the materials and methods used to study folklore and folklife, emphasizing the historical context and development of folklore studies in North America and Europe, field research, performance theory, and other topics. (Also offered as ENGL 732.) 4 cr.

699. Senior Thesis
Independent work in the library or field; recommended for, but not confined to, majors intending to pursue graduate studies; required for honors candidates. Contact staff to obtain approval and arrange supervision prior to senior year. 4 or 8 cr. 2 semesters, 8 cr. required for honors; an IA grade (continuous course) given at end of first semester.

700. Internship
Provides student with supervised practical experience in anthropology in one of the following areas: (A) professional or community support work within an academic or applied anthropology setting; (B) teaching; (C) museum work; (D) archaeological laboratory or field work; (E) research on a faculty research project; (F) editorial work on a journal or faculty book project. May be repeated up to 8 credits. Prereq: permission. 1–4 cr.

714. Caste, Class, and Colonialism
Peasants, urban communities, race and ethnicity, stratification, local-national integration, the effects of colonialism, modernization, and social change. Prereq: ANTH 411 or permission. 4 cr.

#750. Middle East: Issues of Ethnicity, Work, and Identity
Community studies approach to such topics as ethnicity and identity in the interrelationship of language, religion, and corporate membership in a community; ethnic division of labor; work, pluralism, and family networks; mobility and immobility; estates vs. classes. (Also offered as SOC 750.) 4 cr.

770. Culture, Personality, and Society
A cross-cultural view of the development of personality as emergent from genetic, situational, and sociocultural determinants; analysis of the dynamic interplay of sociocultural and psychological behavior systems. Prereq: prior courses in sociology, anthropology, or psychology. (Also offered as SOC 770.) 4 cr.

795, 796. Reading and Research in Anthropology
A) Cultural/Social Anthropology; B) Anthropological Linguistics; C) Archaeology; D) Physical Anthropology. Prereq: 12 credits of anthropology; permission. Variable (normally 1–8) cr.

#797. Advanced Topics in Anthropology
Advanced or specialized courses presenting material not normally covered in regular course offerings. May be repeated, but not in duplicate areas.

Course descriptions on file in department office during registration. A) Social Organization; B) Economic Anthropology; C) Anthropology of Religion; D) Political Anthropology; E) Social Impact Analysis; F) Cultural Ecology; G) Prehistoric Archaeology; H) Historic Archaeology; I) Cultural Resources Conservation; J) Lithic Analysis; K) Ceramic Analysis; L) Faunal Analysis; M) Human Evolution; N) Human Variations; O) Anthropological Theory. Prereq: ANTH 411 or 412 (as appropriate);/or permission. 4 cr.

Art and Art History (ARTS)

(For program description, see page 32.)

Chairperson: Scott Schnepf
Professors: David S. Andrew, Arthur E. Balderacchi, Carol Shore, David R. Smith, Mara R. Witzling
Associate Professors: Grant Drumheller, Patricia A. Emison, Chris Enos, Eleanor M. Hight, Craig A. Hood, Maryse Searls McConnell, Michael McConnell, Jennifer K. Moses, Scott Schnepf
Assistant Professors: Langdon C. Quin
Faculty-in-Residence, Assistant Professors: Jerry A. Culbertson, John H. Jacobsmeyer
Adjunct Assistant Professor: Vicki C. Wright
Lecturer: Joan Larson Esch

Art Studio

Two-Dimensional Courses

Architecture
455. Introduction to Architecture
Study of architectural graphics, design theories, form determinants, and the architect in society. Includes case study projects. Lab. 4 cr.

Drawing
532. Introductory Drawing
Students deal primarily with observational perspective problems (still life, architectural interiors, landscape, etc.), utilizing a full range of drawing materials. Lab. 4 cr.

632. Intermediate Drawing
Focuses on three major topics: (1) linear perspective, (2) anatomical and/or structural aspects of the human figure, and (3) special materials (painterly and/or mixed media). Outside assignments encourage original thinking about image making. Prereq: ARTS 532. Lab. 4 cr.

633. Life Drawing
A continuation of the more formal aesthetic issues introduced in introductory and intermediate drawing with an emphasis on drawing the human figure from life. Prereq: ARTS 632. Lab. 4 cr.

732. Advanced Drawing
Treatment of more complex compositional problems; application of a broader range of solutions to pictorial concepts to reinforce individual concepts of image and technique. May be repeated for a maximum of 12 credits. Prereq: ARTS 633. Lab. 4 cr.

Painting
544. Water Media I
Transparent and opaque water color. Prereq: ARTS 546. Lab. 4 cr.

546. Introductory Painting
Use of the still life and the figure. Color, value, composition, and some art history. Slide lectures. Prereq: ARTS 532. Lab. 4 cr.

#645. Water Media II
Continuation of ARTS 544; introduction to other water-based media. Prereq: ARTS 544. Lab. 4 cr.

646. Intermediate Painting
More complex issues of the visual language. Still life and the figure continue as dominant subject matter. Slide lectures. May be repeated for a maximum of 8 credits. Prereq: ARTS 546. Lab. 4 cr.

746. Advanced Painting
Development of a higher degree of technical skill to handle more advanced conceptual problems. Class assignments may be more individually directed. May be repeated for a maximum of 12 credits. Prereq: ARTS 646 (8 cr.). Lab. 4 cr.

Photography
551. Photography
Introduction to theory and practice of black and white photography as an expressive medium. Students provide their own cameras. Prereq: any art dept. course or permission. Lab. 4 cr.

651. Photography Workshop
Individualized projects involving creative methods, including color, manipulative, and documentary techniques. Students provide their own cameras. Prereq: ARTS 551. May be repeated. Lab. 4 cr.

Printmaking
536. Introduction to Printmaking: Intaglio
Study of intaglio printmaking techniques, including etching, dry point, and engraving. Prereq: ARTS 532 or permission. Special fee. Lab. 4 cr.

537. Introduction to Printmaking: Lithography
Study of lithographic processes on stone and aluminum plate. Prereq: ARTS 532 or permission. Special fee. Lab. 4 cr.

636. Printmaking Workshop
Emphasis on development of the individual's imagery in lithography and/or intaglio, including an introduction to multicolor printmaking. May be repeated for a maximum of 12 credits. Prereq: ARTS 536 and/or ARTS 537. Lab. 4 cr.

Three-Dimensional Courses

All courses elective by permission of the Department of the Arts.

Ceramics
501. Ceramics
Theory and practice of basic ceramics; includes all methods of basic construction, decoration, glazing, and kiln firing. Emphasis on each individual's perceptual development. Special fee. Lab. 4 cr.

601. Ceramics Workshop
Application of new ceramic materials and techniques, with emphasis on ideas and their expression through form and content. Experimentation encouraged. May be repeated. Prereq: ARTS 501. Special fee. Lab. 4 cr.

701. Clay and Glaze Calculation
Presentation and practice of a scientific method for calculating glazes, based on the empirical formula technique. Includes background information on clay and the chemistry of glazes and glaze materials. Prereq: ARTS 501. Special fee. Lab. 4 cr. (Not offered every year.)

Sculpture
567. Introductory Sculpture
Theory and practice of designing three-dimensional compositions using a series of progressive assignments to develop a practical understanding of visual elements, including line, form, space, mass, and plane. Special fee. Lab. 4 cr.

667. Sculpture Workshop
Design and production of sculpture focusing on various materials and techniques and how they relate to composition and content. Emphasis on understanding visual language while developing an individual style. May be repeated. Prereq: ARTS 567. Special fee. Lab. 4 cr.

#767. Bronze Casting
Practice of designing, building, and maintaining a working sculpture foundry. Emphasis on a thorough understanding of the lost-wax investment casting process, including pattern making, mold making, wax working, investing, casting, chasing, and patination. Prereq: ARTS 667 (8 cr.). Lab. 4 cr. (Not offered every year.)

Woodworking
525. Woodworking
Theory and application of basic woodworking principles; design concepts, primarily utilitarian, applied to shaping a mass, constructing volumetric and line/plane forms; use of a complete range of hand, portable powered, and stationary powered tools. Special fee. Lab. 4 cr.

625. Furniture Design Workshop
Design and construction of the major furniture forms, using a broad range of techniques (including lamination, bending, and molding) to execute a series of concept areas relevant to furniture. May be repeated. Prereq: ARTS 455 or 525 or 567. Special fee. Lab. 4 cr.

725. Wood Multiples
Development and construction of prototype furniture designs intended for more than one-of-a-kind production; jig and production strategies. (Offered concurrent to I.W.F.-sponsored biennial National Student Furniture Design Competition.) Prereq: ARTS 625 (4 cr.). Lab. 4 cr.

Special Courses

598. Sophomore Seminar
Encourages experimentation by integrating verbal and plastic understandings through readings, discussions, studio work. Field trips. Prereq: two art history courses and two studio arts courses. 4 cr.

695. Special Problems in the Visual Arts
Topics and prerequisites to be announced before preregistration. May be repeated with permission of the instructor. Lab. 4 cr.

700H. Honors Seminar
Requires successful completion of a written thesis supervised by two faculty advisers (one each from studio and art history faculty) to be reviewed by members of the department honors committee. The

art history thesis will involve an original problem in art history and the studio art thesis will examine the student's own work. Honors students only. 4 or 8 cr.

796. Independent Study in the Visual Arts
A) Photography; B) Sculpture; C) Drawing; D) Painting; E) Printmaking; F) Water Media; G) Architectural Design; H) Curatorial Assistant; I) Art History; J) Ceramics; K) Wood Design. Open to highly qualified juniors and seniors. May be repeated to a total of 8 cr. Prereq: permission of department chairperson and supervising faculty member or members. 1–8 cr.

798. Seminar/Senior Thesis
Readings and discussions oriented toward the intellectual premises of art. Culminates in mounting an exhibition of the student's work. Required of all students in the B.F.A. program. Other advanced students may elect with instructor's permission. A year-long course; an IA grade (continuous course) will be given at the end of the first semester. Lab. Variable credit; may be repeated to a total of 8 cr. B.F.A. majors must take 8 credits total. 4–8 cr.

Art History

All introductory 400- and 500-level courses in art history have the following goals: to introduce the discipline, its vocabulary, its periods and styles, its media, and its various approaches.

Exemption from prerequisites by permission of instructor.

#431. Visual Studies
Appreciation and understanding of the visual arts. Works from variety of periods; emphasis on style, formal analysis, methods, and materials of production. For freshmen and sophomores; open to juniors and seniors by permission. Not for art dept. major credit. Writing intensive. 4 cr.

480. Introduction to Art History
Analysis of the central forms and meanings of art history through intensive study of selected artists and monuments. The course will include works of architecture, sculpture, painting, and the graphic arts. Topics will vary but might include the Parthenon, Chartres Cathedral, Michelangelo's Sistine Chapel ceiling, Rembrandt's self-portraits, Monet's landscapes, Picasso's Guernica, Frank Lloyd Wright's Fallingwater, Georgia O'Keeffe's abstractions, ukiyo-e prints, and Benin sculpture. Writing intensive. 4 cr.

487. Themes and Images in Art
Examination of one or two central ideas embodied in the artistic imagery of painting, sculpture, and architecture, covering a wide cultural spectrum. Stress on the interconnection between visual forms and the symbolic and philosophical concepts they express. Papers and essay examinations are required. A) Classicism and Its Discontents; B) Nature and Culture in Art; C) Primitivism and Modern Art; D) Major Mythic Images of Women; E) Symbols of Innocence and Experience in the New World; F) Abstraction and Ideology. Descriptions of sections available from the art department office. No more than one section of this course may be taken for credit. Writing intensive. 4 cr.

#570. Art of the Ancient World
The chief and representative monuments in architecture, sculpture, and painting from Paleolithic times to the late Roman Empire. The history of art from a broadly humanistic perspective with investigation of works such as Stonehenge, the pyramids at Giza, Mesopotamian votive figures, the Parthenon and its sculptures, and illusionistic Roman frescoes at Pompeii. 4 cr.

571. Art of the Middle Ages
The chief and representative monuments in architecture, sculpture, and painting from early Christian times to the Gothic era. The history of art from a broadly humanistic perspective with investigation of works such as the Constantinian basilicas, Byzantine mosaics, the Lindisfarne Gospels, the portal sculpture of Autun, and Chartres cathedral. 4 cr.

572. Art of the Age of Humanism
The chief and representative monuments in architecture, sculpture, and painting from the early Florentine Renaissance to the courtly era of Louis XVI. The history of art from a broadly humanistic perspective with investigation of works such as Masaccio's frescoes, Michelangelo's David, the Ghent Altarpiece, the basilica of St. Peter's, Rembrandt's self-portraits, and the Georgian house in Portsmouth. 4 cr.

573. Art of the Modern World
The chief and representative monuments in painting, sculpture, and architecture from the Age of Reason to the present. The history of art from a broadly humanistic perspective with investigation of works such as David's revolutionary paintings, Manet's Olympia, Rodin's Gates of Hell, Picasso's Demoiselles d'Avignon, Pollock's drip paintings, Warhol's soup cans, Serra's Tilted Arc, and the architecture of Ledoux, Wright, Le Corbusier, and Venturi. 4 cr.

574. Architectural History
A survey of the chief and representative buildings from the entire history of architecture. Analysis of buildings with regard to structure, form, and symbolic content, concentrating on major works such as the pyramids, the Roman Pantheon, the Gothic cathedral, the Renaissance palace, the Baroque church, and the modern skyscraper. Writing intensive. 4 cr.

580. Survey of Art History I
A chronologically and geographically broad introduction to the history of art and architecture and to the discipline of art history. The first semester of the two-semester sequence ranges from the Ancient World to the Renaissance. Writing intensive. 4 cr.

581. Survey of Art History II
A chronologically and geographically broad introduction to the history of art and architecture and to the discipline of art history. The second semester of the two-semester sequence ranges from the Renaissance to the present. ARTS 580 is recommended as preparation for, but it is not a formal prerequisite for 581. Writing intensive. 4 cr.

608. Arts and American Society: Women Writers and Artists, 1850–Present
Team-taught course studying the impact of gender definitions on the lives and works of selected American artists. Considers lesser-known figures such as Fannie Fern, Lilly Martin Spencer, and Mary Hallock Foote as well as better-known artists such as Willa Cather and Georgia O'Keeffe. Prereq: permission or one of the following: WS 401, HIST 566, ENGL 585, 586, 685, 785, or a 600-level art history course. (Also offered as ENGL 608, HUMA 608, and HIST 608.) Studio art majors who take this course for major credit will not receive major credit for ARTS 610. Writing intensive. 4 cr.

#610. Regional Studies in America: New England Culture in Changing Times
Team-taught course investigating some of the major contributions New England has made to American life. Focusing on three periods: the Puritan era, 1620–90; the Transcendental period, 1830–60; and the period of emerging industrialism in the late 19th century. (Also offered as ENGL 610, HIST 610, and HUMA 610.) Studio art majors who take this course for major credit will not receive major credit for ARTS 608. Writing intensive. 4 cr.

#654. 17th- and 18th-Century American Architecture
Chief colonial architectural styles and monuments; their relation to European antecedents. Field trips. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

655. Early Modern Architecture: Revolution to World War I
Chief styles and monuments of American and European architecture from the visionaries (Ledoux, Latrobe, Jefferson) to the birth of the skyscraper and nonhistorical architecture. Unique American contribution to modern architectural thought. Field trips. Prereq: one 400- or 500-level art history course. 4 cr.

656. Contemporary Architecture: The Buildings of Our Times
Chief styles and monuments of American and European architecture from Frank Lloyd Wright and the International Style to the present. Field trips. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

674. Greek Art
Greek art and architecture from the Bronze Age civilizations of Minoan Crete and Mycenaean Greece to the late classical period of the 4th century B.C. Emphasis on the interplay of narrative and abstraction in the development of a distinctively Greek aesthetic consciousness, on the forms of art and thought in the Archaic Period, and on the flowering of the classical style in the 5th century B.C. Prereq: one 400- or 500-level art history course. 4 cr.

675. Roman Art
Art and architecture in the ancient Mediterranean world from Alexander the Great to the fall of the Roman Empire. Emphasis on the interplay between the Greek and Etruscan traditions between public and private in Roman life and art, and the breakdown of classical ideals in the late empire. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

#676. History of Illuminated Manuscripts
During the Middle Ages manuscripts were the primary locus of the painting tradition. After a consideration of the development of the manuscript book and our method of study, this course will consider the major monuments of manuscript illumination and their painted cycles of miniatures. Such important works as the Book of Kells, the Winchester Bible, the Psalter of St. Louis, and the Trés Riches Heures of Jean de Berry are considered in their cultural and historical contexts. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

677. Early Medieval Art
Development of Christian art from 300 to 1000 A.D. Study of the formulation of a new visual language via the intersection of Mediterranean and northern European traditions. Major focus on early Christian catacombs, Byzantine mosaics, insular manuscripts, and Carolingian imperial art. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

678. Romanesque and Gothic Art
The culmination of medieval artistic development through examination of major architectural monuments and their sculptural programs, as well as important centers of manuscript illumination. The period from the year 1000 A.D. through the beginnings of the Renaissance in the early 15th century will be stressed. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

679. Northern Renaissance Art I
Painting, sculpture, graphic arts, and manuscript illumination in France, Germany, and the Netherlands in the 14th and 15th centuries. Emphasis on the development of the traditions of Northern naturalism and the emergence in 15th-century Flanders of a distinct Renaissance consciousness, which runs parallel to contemporary trends in Italy. Major figures include the Limbourg brothers, Claus Sluter, Jan van Eyck, and Hugo van der Goes. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

680. Northern Renaissance Art II
Painting, sculpture, and graphic arts in Germany and the Netherlands in the 16th century. Emphasis on the encounter of the Northern tradition with the classical and humanistic culture of the Italian Renaissance and on the impact of the Protestant Reformation. Major figures include Bosch, Dürer, Holbein, and Bruegel. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

681. Early Renaissance Art in Italy
Painting, sculpture, and architecture in Italy during the 14th and 15th centuries. The emergence of Renaissance style in the art of such masters as Giotto, Masaccio, Donatello, Bellini, and Piero della Francesca. Attention is also given to the broad cultural developments to which they belong. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

#682. High Renaissance and Mannerist Art in Italy
Continuation of ARTS 681. Primary focus on the formation of High Renaissance classicism in the art of Leonardo, Michelangelo, Raphael, Bramante, and Titian. Attention is also given to the subsequent crisis of the classical ideal in 16th-century mannerism. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

683. Baroque Art in Southern Europe
Painting, sculpture, and architecture in Italy, France, and Spain during the 17th century. Emphasis on the diverse and innovative character of art in this period of crisis between the Renaissance and the modern era. Intensive analysis of the works of such major masters as Bernini, Caravaggio, Poussin, and Velazquez. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

684. Baroque Art in Northern Europe
Dutch and Flemish painting in the 17th century. Examination of such major figures as Rubens, Rembrandt, Van Dyck, and Vermeer. Attention is also given to the development of the genres and to the many little masters who practiced them. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

685. Graphic Art of the Renaissance and Baroque Periods
The availability of paper and the invention of the printing press made it possible for drawings and prints to become fundamental elements in the western artistic tradition. Prints have been called major instigators of the production of secular art and of overtly experimental art. They were the first art made with an elite but relatively broad class of collectors in mind, and—in different examples—the first art that could be owned even by the poor. Examination of anonymous works, works by artists famous only as printmakers, and the printed work by or after Mantegna, Dürer, Lucas van Leyden, Raphael, Michaelangelo, Bruegel, and Rembrandt, as well as drawings of the period. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

686. Neo-Classicism to Romanticism
European painting and sculpture in its socio-political context, with emphasis on the relation of idea to image, from David and the French Revolution to the romantic landscapes of Friedrich and Runge, and the romantic-classic debate involving Delacroix and Ingres. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

687. Realism and Impressionism
The rise of realism and impressionism in the second half of the 19th century in France. Emphasis on the influence of the plein air sketch of the English and Barbizon landscape painters, the realism of Courbet and Millet, the Haussmannization of Paris and the painting of modern life, Seurat and neo-impressionism, and the late works of Cézanne and Monet. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

688. Twentieth-Century Art I
Evolution of modernism from symbolism and post-impressionism to World War II. Emphasis on the art and theory of cubism, expressionism, abstraction, surrealism, and social realism. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

689. Twentieth-Century Art II
Examines abstract expressionism as a framework for analyzing art since World War II. Focus on "Action Painting" and Color Field Painting, minimalism and conceptual art, pop art, earthworks and sited sculpture, new image painting, post-modernism, and related critical theory. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

690. Women Artists of the Nineteenth and Twentieth Centuries
Examination of the works of women artists of the past two centuries. After considering current scholarship related to some of the theoretical issues involved in studying art by women, the works of women artists from the Middle Ages through the early 19th century will be surveyed briefly. Focus will then shift to works by women artists of the past 150 years and their relationship to and impact on major movements in modern art. Prereq: one art history and another appropriate course. Writing intensive. 4 cr.

#691. A History of Venetian Art
The artistic culture of Venice from Byzantine times through Tiepolo and Canaletto introduced. Course emphasis will be on Renaissance Venice, including topics such as the reclining female nude, the courtesan portrait, and the origins of landscape painting. Artists to be studied include Bellini, Giorgione, Titian, and Palladio. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

692. History of Photography
History of the photograph from its origins in the aesthetic and technological context of the early 19th century to the present. Lectures and discussions on such topics as the impact of early photography on painting, 19th-century landscape and travel photography, pictorialism, abstract photography, the photograph as metaphor, photojournalism and the interpretation of war, and postmodernism and photography. Critical reading of texts by Beaudelaire, Benjamin, Barthes, Sontag, and Sekula. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

693. American Art
A chronological survey of painting and sculpture in the United States from the colonial period to the present. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

697. Art of the Far East
Examination of the major trends in painting, sculpture, and architecture of India, China, and Japan, with emphasis on the relation of philosophical concepts to imagery. Prereq: one 400- or 500-level art history course. Writing intensive. 4 cr.

699. Museum Studies
Introduction to the history and practices of American museums, including their purposes, organization, interpretation, policies, and procedures. Use of the Art Gallery, visits to other museums, lecturers. Prereq: two courses in art history and permission. Writing intensive. 4 cr.

795. Methods of Art History
Essential bibliography and the methodology of research; the variety of approaches to art historical scholarship. Readings, discussion, and projects in connoisseurship, iconography, and other art historical methods. Open to advanced students with a strong art history background. It is strongly recommended that students take this course in their junior year. Prereq (for non–art history majors): permission. Writing intensive. 4 cr. (Usually offered fall semester only.)

799. Seminar in Art History
Topics and prerequisites to be announced before preregistration. May be repeated with permission of instructor. Writing intensive. 4 cr.

(See also ARTS 695, 700H, and 796 under Special Courses.)

Art Education

All courses elective by permission of the Department of the Arts.

600. Internship
Election to take an internship in the following areas within the Department of Art and Art History: (600A) Painting, Drawing, Printmaking, Photography, Sculpture, Woodworking, Ceramics, and

Graphic Design; (600B) Art History; (600C) Architecture; and (600D) Museum Work. Cannot be used to satisfy one of three electives in the Studio B.F.A. Program and one of two electives in the Studio B.A. Program. In art history, it can be taken as an elective above the 11-course major requirement. May be repeated up to 8 cr. Prereq: permission. 1–4 cr.

791. Art Education (Elementary)
Children's creative growth as revealed through their visual expression. Development of elementary art education programs with emphasis on objectives, methods, materials, and techniques to foster creativity. Suggested prereq: EDUC 500. 4 cr.

#792. Art Education (Secondary)
The creative process in the visual arts in relation to the development and skills of middle and high school students in the public schools; mechanics of beginning and maintaining a secondary art program; exploring resources for art education programs on the secondary level. Suggested prereq: EDUC 500. 4 cr.

#797. Art Education Seminar
Architecture as a resource in teaching. Primarily for secondary school teachers and those involved in adult education. Not for major credit in art dept. (See also ARTS 796.) 4 cr.

Biochemistry and Molecular Biology (BCHM)

(For program description, see page 82.)

Chairperson: Clyde L. Denis
Professors: Clyde L. Denis, Thomas M. Laue, Samuel C. Smith, Stacia A. Sower, James A. Stewart
Research Professor: Vernon N. Reinhold
Associate Professors: John J. Collins, Rick H. Cote, Anita S. Klein, Andrew P. Laudano
Assistant Professor: George Eric Schaller
Instructor: Carol G. Waghorne-Ferrucci

600. Field Experience
A supervised experience providing the opportunity to apply academic experience in settings associated with future professional employment and/or related graduate opportunities. Must be approved by a faculty advisor selected by the student. May be repeated to a maximum of 8 credit hours. Prereq: Permission. 1–4 cr. Cr/F.

658. General Biochemistry
A comprehensive, introductory course emphasizing the cellular metabolism and the structure and function of proteins, nucleic acids, carbohydrates, and lipids. Prereq: BIOL 411, CHEM 545-546, CHEM 547-548, or CHEM 651-652. Coreq: BCHM 659 (except BCHM majors who are encouraged to take BCHM 755). 3 cr.

659. General Biochemistry Laboratory
Structured laboratory experiments that provide training in analytical and preparative techniques fundamental to modern biochemistry and molecular biology. Coreq: BCHM 658 (except for BCHM majors who are encouraged to take BCHM 755 instead of BCHM 659). Special fee. 2 cr.

702. Endocrinology
Structure and function of vertebrate endocrine systems. Influence of endocrine system on the molecular and biochemical mechanisms and physiology of vertebrates, with special reference to mammals. Current investigations of the endocrine system as a regulator and integrator of body functions including such systems as growth, reproduction, metabolism, differentiation, and behavior. (Also offered as ANSC 702.) Prereq: BCHM 658 or 751;/or permission. 4 cr.

706. Human Genetics
Genetic basis of human traits and diseases. New understanding added by molecular genetic approaches. Human genome project, gene therapy. Discussion of genetic components of quantitative and behavioral traits, and human evolution. Prereq: BIOL 604 or permission; junior, senior, or graduate standing. (Also offered as GEN 706.) 3 cr. Not offered every year.

711. Genetics of Eukaryotic Microbes
Expression and transfer of genetic material in eukaryotic microbes including fungi, algae, protozoa, and Caenorhabditis elegans. Laboratory experience in DNA sequence entry retrieval and analysis. Macintosh work stations are used for accessing and retrieving data from the National Library of Medicine and other sources via the Internet. Prereq: MICR 503; BIOL 604 (Also offered as GEN 711 and MICR 711). Special fee. Lab. 4 cr.

750. Physical Biochemistry
Structure, interactions, and physical-chemical properties of biomolecules. Thermodynamic, hydrodynamic, and spectroscopic methods for the study of proteins and nucleic acids. Prereq: BCHM 751;/or permission. 3 cr.

751-752. Principles of Biochemistry
In-depth survey of biochemistry; macromolecular structure; metabolism of proteins, nucleic acids, carbohydrates, and lipids; molecular biology of DNA, RNA, and protein synthesis and regulation. Prereq: CHEM 547-548 or CHEM 651-652 or CHEM 545 and 546;/or permission. 4 cr.

754. Laboratory in Biochemistry and Molecular Biology of Nucleic Acids
Application of modern techniques to the analysis of biomolecules, with an emphasis on nucleic acids; includes DNA isolation and analysis, cloning, sequencing, and analysis of gene products. No credit if credit has been received for MICR 704. Prereq: BCHM 658/659; 751; or permission. (Also offered as PBIO 754 and GEN 754.) Special fee. Lab. 5 cr.

755. Laboratory in Biochemistry and Molecular Biology
Application of modern techniques to the characterization of biomolecules, with an emphasis on proteins and nucleic acids; analysis of enzyme kinetics; and basic techniques used in molecular biology. (Majors anticipating taking BCHM 799 should take this course in their junior year.) Prereq: BCHM 751-752;/or permission. BCHM 752 may be taken concurrently with BCHM 755. Special fee. Writing intensive. 5 cr.

760. Cellular Signaling Processes
Signal transduction and the regulation of metabolism, cell growth, and cellular activation; molecular basis of cellular communication. Prereq: BCHM 658 or 751;/or permission. Writing intensive. 4 cr.

763. Biochemistry of Cancer
Molecular mechanisms of viral and chemical carcinogenesis; role of oncogenes in normal cell growth, development, and differentiation. Biochemical basis of cancer chemotherapy. Prereq: BCHM 658 or 751;/or permission. 3 cr.

764. Membrane Biochemistry
Structure and biogenesis of membranes and membrane proteins, transport across the membrane and bioenergetic membranes, mechanisms of protein targeting, processing, and trafficking. Prereq: BCHM 658 or 751;/or permission. May be repeated. 3 cr.

765. Molecular Biology and Biochemistry of Plants
Molecular mechanisms and regulation of plant metabolic functions. Structure and function of cellular constituents of plants; role of secondary metabolites. Emphasis on developments in current literature. Complements PBIO 774/775. Prereq: BCHM 658 or 751; BIOL 604;/or permission. (Also offered as PBIO 765.) Writing intensive.3 cr.

771. Molecular Genetics
Structure, organization, replication, dynamics, and expression of genetic information in eukaryotes. Focus on molecular genetic mechanisms of gene expression and its control; molecular genetics methods; molecular genetic control of cell division and differentiation during development. Prereq: BCHM 658 or 751; BIOL 604;/or permission. (Also offered as GEN 771.) 3 cr.

782. Developmental Genetics
The molecular genetic basis of metazoan development. Focuses on how genes direct the process of development and how this problem is analyzed in model organisms using molecular genetic approaches. Topics include: control of cell division, maternal factors, cell-cell interactions, and differential gene expression. Prereq: BIOL 604; BCHM 658 or 751. (Also offered as GEN 782.) 3 cr. (Not offered every year.)

794. Protein Structure and Function
Analysis of how the three-dimensional architecture of proteins and enzymes contributes to their biochemical function. Topics include methods for determining the structure of proteins, protein folding, intermolecular interactions of proteins, mechanisms of enzyme catalysis, enzyme kinetics, protein evolution, and biosynthesis. Prereq: BCHM 658 or 751. 3 cr.

795. Investigations in Biochemistry and Molecular Biology
Independent study in various areas including but not limited to: genetics, signal transduction, gene regulation, molecular evolution, biochemistry of cancer, biophysics of macromolecules, endocrinology, and teaching experience. Prereq: permission. Not more than 4 total credit hours can be applied to BCHM or major electives. 1–4 cr.

799. Senior Thesis
Research in biochemistry and molecular biology for senior majors. A) Developmental Genetics; B) Signal Transduction; C) Gene Regulation; D) Molecular Evolution; E) Biochemistry of Cancer; F) Biophysics of Macromolecules; and G) Endocrinology. May be repeated to a maximum of 4 credits. Prereq: BCHM 659 or 755; permission. 1–4 cr.

Biology (BIOL)

(For program description, see page 83.)

Coordinator: James E. Pollard

400. Professional Perspectives on Biology
Views scope of biology and explores professional opportunities for biological sciences majors. Guest speakers from on and off campus present seminars and lead discussions on contemporary issues in biology. Departmental and interdepartmental major and option programs and strategies for achieving professional goals are discussed. Required for all first-semester biology majors. 1 cr. Cr/F.

#404. Biotechnology and Genetic Engineering: Future Perspectives
History and science of biotechnology and genetic engineering of bacteria, plants, and animals including humans. Applications of DNA technology, cloning, and genetic engineering to agriculture, biomedicine, industrial products and environmental problems. Discussion of economic, social, environmental, legal, and ethical issues related to the applications of biotechnology and genetic engineering. Lab. 4 cr.

411. Principles of Biology I
Introduction to structure and function of cells; tissues and organs; physiological processes; genes and heredity. Required for majors in the biological sciences. Special fee. Lab. 4 cr.

412. Principles of Biology II
The biology of organisms, including survey of kingdoms, behavior, evolution, and ecology. Required for majors in the biological sciences. Special fee. Lab. 4 cr.

#420. Parasites and Pestilence
Ecology of human disease; role of disease in history; biological, social, and economic problems involved in eradication and control. Particular attention to diseases that still account for serious sickness and mortality in overpopulated, underdeveloped countries. No credit toward a major or minor. 4 cr.

528. Applied Biostatistics I
Development of elementary statistical techniques through the analysis of prepared biological data. Continuous and discrete probability distributions; distributions of sample statistics; small-sample theory; regression; correlation; and analysis of variance. No credit for students who have completed ADM 430; DS 420; EREC 525; HHS 540; MATH 644; PSYC 402; SOC 502. 4 cr.

541. General Ecology
Physical and biological factors affecting distribution, abundance, and adaptations of organisms. Population, community, and ecosystem structure and function. Prereq: BIOL 411-412 or equivalent. Special fee. Lab. 4 cr.

600. Field Experience
A supervised experience providing the opportunity to apply academic experience in settings associated with future professional employment and/or related graduate opportunities. Must be approved by a faculty adviser selected by the student. May be repeated to a maximum of 8 credit hours. Prereq: permission. 1–4 cr. Cr/F.

604. Principles of Genetics
Chemical structure of genetic material, Mendelism, gene recombination, and chromosome mapping. Mutation, gene expression and regulation, recombinant DNA. Quantitative inheritance and population genetics. Prereq: BIOL 411 and 412; CHEM 403 and 404. College math or statistics suggested. Offered each semester. Special fee. 4 cr.

605. Eukaryotic Cell and Developmental Biology
Cell and developmental biology of eukaryotic animals and plants. General topics include the structure and function of major cellular compartments, an analysis of intracellular dynamics, mechanisms of intercellular chemical communication, and mechanisms for elaborating and integrating multicellular animals and plants. Special topics include mitogenesis, cell motility, oncogenesis, control of gene expression, and pattern formation. Prereq: BIOL 411 and 412; CHEM 403 and 404. Special fee. Lab. 3 cr.

695, 696. Biology Teaching Practices
Students assist in teaching labs in undergraduate biology courses supervised by the lab coordinator/instructor. Responsibilities include facilitating lab endeavors, giving a presentation, and writing a report. Prereq: permission. May be repeated to 8 cr. 1–4 cr.

702. Genetics Lab
An experimental approach to understanding the fundamental principles of heredity. Theoretical aspects of genetics hypothesis testing, data analysis, and techniques of isozyme and DNA electrophoresis and polymerase chain reaction (PCR). In lab, students conduct mating and mutagenesis experiments with plants, animals, and yeast; do human DNA fingerprinting; and employ techniques of DNA isolation, electrophoresis, PCR, cytogenetics, and statistical analysis to generate and interpret genetic data. Prereq: BIOL 604 or equivalent. Special fee. (Also offered as GEN 702.) 4 cr.

711. Applied Biostatistics II
Design and analysis of biological and ecological research experiments. "Real world" studies used to discuss the identification of hypotheses, appropriate experimental design, and the application of statistical analyses including ANOVA, ANCOVA, correlation and regression, cluster analysis, classification and ordination techniques. Theoretical statistical concepts tailored to consider student's own thesis and dissertation research, allowing statistical problems to be addressed at various stages of the research process. Common computer packages used for analyses. Prereq: BIOL 528; permission. Special fee. 4 cr.

#791. Problems in the Teaching of High School Biology
Objectives and methods; selection and organization of materials, preparation of visual aids and other projects; use of field trips. Prereq: two years of biological science; permission. 4 cr.

795, 796. Biology Independent Investigations
Topics may include teaching practicum in a biological science supervised by a biology faculty member (permission required); research practicum in a biological science supervised by a biology faculty member (permission required), or special topics of current interest in biology. Lecture-discussion format. Prereq: 12 credits of biology or permission. May be repeated to 4 credits. 1–4 cr.

799. Honors Thesis
Independent research requiring a written proposal, a thesis, and a presentation of research results to an audience of faculty and/or students. Intended for Biology majors completing Biology Honors-in-Major requirements. Contact Biology Program Coordinator prior to senior year to arrange supervision and obtain permission. 2 consecutive semesters, 2-8 cr. (4 cr. minimum total)

Departmental Biological Science Courses

(Other biological science courses include those listed and described under the following department/program headings: Animal Sciences, p. 122; Biochemistry and Molecular Biology, p. 129; Genetics, p. 161; Microbiology, p. 186; Natural Resources, p. 191; Nutritional Sciences, p. 193; Plant Biology, p. 199; and Zoology, p. 219.)

Business Administration (ADMN)

(For program description, see page 96. For faculty listings, see pages 119, 139, 144, 170, 179, 180.)

685-686. Study Abroad
Open to students studying abroad in the discipline as approved by the department chair and Undergraduate Programs Office. 1–16 cr. Cr/F.

695. Independent Study
Individual research projects that are student designed. Initial sponsorship of a business administration faculty member must be obtained, and approval of WSBE Undergraduate Programs Office and department chair. For juniors and seniors in high standing. 1–12 cr.

696. Supervised Student Teaching Experience
Participants are expected to perform such functions as lead discussion groups, assist faculty in undergraduate courses they have successfully completed, or work as peer advisers in the advising center. Enrollment limited to juniors and seniors who have above-average G.P.A.s. Reflective final paper is required. Prereq: permission of instructor, department chair, and director of undergraduate programs. No more than 4 credits may be earned as a teaching assistant in any one course. 1–8 cr.

795. Internship
On-the-job skill development through fieldwork in an organization (business, industry, health, public service, etc.). Normally, supervision is provided by a qualified individual in the organization, with frequent consultation by a faculty sponsor. Written report required. Internships may be part or full time, with course credits assigned accordingly. May not be used as a Group C elective. Prereq: permission of instructor, department chair, and director of undergraduate programs. 1–16 cr. Cr/F.

#798. Topics in Business Administration
Special topics; may be repeated. Prereq: permission. 2–4 cr.

799. Honors Thesis/Project
Supervised research leading to the completion of an honors thesis or project; required for graduation from the honors program in administration. Prereq: permission of director of undergraduate programs and department chair. 4–8 cr.

Chemical Engineering (CHE)

(For program description, see page 53.)

Chairperson: Stephen S.T. Fan
Professors: Stephen S.T. Fan, Ihab H. Farag, Virendra K. Mathur
Associate Professors: Dale P. Barkey, Russell T. Carr, Donald C. Sundberg, Palligarnai T. Vasudevan
Assistant Professor: Michael J. Lochhead

410. Survey of Current Energy and Pollution Control Technology
Energy supply in this country and the world; conventional fuel reserves: coal, oil, natural gas; alternative sources: nuclear, solar, geothermal, etc. Forecasts and strategies to meet needs. Environmental pollution, sources, and economic and environmental impacts. Methods for pollution control. Regulatory standards for environmental protection. Prereq: good background in high school chemistry. 4 cr.

501. Introduction to Chemical Engineering I
Systems of units; material balances and chemical reactions; gas laws; phase phenomena. 3 cr.

502. Introduction to Chemical Engineering II
Energy and material balances for systems with and without chemical reactions; design case studies. 3 cr.

601. Fluid Mechanics and Unit Operations
Continuity, momentum, and energy equations; laminar and turbulent flow in pipes; rheology. Applications to flow in porous media, filtration, and fluidization. 3 cr.

602. Heat Transfer and Unit Operations
Thermal properties of materials, steady-state and transient conduction and convection; radiation; applications to heat exchangers and process equipment. 3 cr.

603. Applied Mathematics for Chemical Engineers
Mathematical modeling and analysis of chemical engineering problems. Analytical methods for first- and second-order differential equations; numerical solutions; series solutions; Bessel functions; Laplace transforms; matrix algebra. Interpretation and solution of partial differential equations. Prereq: knowledge of scientific computer programming. Lab. 4 cr.

604. Chemical Engineering Thermodynamics
Volumetric and phase behavior of ideal and real gases and liquids; cycles; steady-flow processes; chemical equilibrium. Lab. 4 cr.

605. Mass Transfer and Stagewise Operations
Diffusion in gases, liquids, and solids; design and analysis of distillation, absorption, adsorption, extraction, and other stagewise equipment and operations. 3 cr.

606. Chemical Engineering Kinetics
Use of laboratory data to design commercial reactors. Continuous, batch, plug-flow, and stirred-tank reactors for homogeneous and catalytic multiphase reactions. 3 cr.

608. Chemical Engineering Design
Introduction to cost engineering. Application of acquired skills to design of chemical processes. Individual major design project required. Lab. 3 cr.

608E. Chemical Engineering Design-Environmental
Introduction to cost engineering. Application of acquired skills to design of chemical processes. Individual major design project required, with environmental engineering applications. 3 cr.

612. Chemical Engineering Laboratory I
Selected experiments in fluid mechanics, heat transfer, and unit operations. Writing intensive. 3 cr.

612E. Chemical Engineering Laboratory I—Environmental
Selected experiments in fluid mechanics, heat transfer, and unit operations, with emphasis on environmental engineering. Writing intensive. 3 cr.

613. Chemical Engineering Laboratory II
Selected experiments in mass transfer, stagewise operations, thermodynamics, and kinetics. Writing intensive. 3 cr.

613E. Chemical Engineering Laboratory II—Environmental
Selected experiments in mass transfer, stagewise operations, thermodynamics, and kinetics with emphasis on environmental engineering. Writing intensive.3 cr.

695. Chemical Engineering Project
Independent research problems carried out under faculty supervision. 1–4 cr.

696. Independent Study
Prereq: permission of the adviser and department chairperson; granted only to students having superior scholastic achievement. 1–4 cr.

701. Introduction to Polymer Engineering
Principles of polymer chemistry, polymerization kinetics, polymer rheology, and material characteristics. Design and analysis of polymer reactors, extruders, molding machines, and other forming operations. Lab. 4 cr.

705. Natural and Synthetic Fossil Fuels
Study of U.S. and foreign reserves of coal, oil, and natural gas. Petroleum processing and refining. Coal, oil shale, and tar sand. Gasification and liquefaction of coal. Lab. 4 cr.

709. Fundamentals of Air Pollution and Its Control
The origin and fate of air pollutants. Fundamentals of atmospheric meteorology, chemistry, and dispersion phenomena. Control of air pollutants and the related equipment. Current issues. Prereq: MATH 527; CHEM 403-404. Lab. 4 cr.

712. Introduction to Nuclear Engineering
Development of nuclear reactors; binding-energy; radioactivity; elements of nuclear reactor theory; engineering problems of heat transfer, fluid flow, materials selection, and shielding; environmental impacts. 4 cr.

744. Corrosion
Fundamentals of corrosion processes in industrial and environmental settings; thermodynamics, kinetics, and mass transport in local corrosion cells; protection by electrochemical, chemical, surface modification or barrier methods; instrumental methods in corrosion science. Lab. 4 cr.

#751. Process Simulation and Optimization
Techniques for computer-aided analysis of chemical processing systems. Development of mathematical models to describe process behavior. Application of optimization techniques. Prereq: a knowledge of scientific computer programming. Lab. 4 cr.

752. Process Dynamics and Control
Dynamic behavior of chemical engineering processes described by differential equations; feedback control concepts and techniques; stability analysis. Lab. 4 cr.

752E. Process Dynamics and Control—Environmental
Dynamic behavior of chemical engineering processes described by differential equations; feedback control concepts and techniques; stability analysis; application in pollution control. Lab. 4 cr.

#754. Graphic, Numerical, and Finite Element Applications in Chemical Engineering
Computational methods for solving differential equations resulting from the modeling of a process or physical phenomena. Graphical display of results of data and of curve-fitted equations. Use of interactive graphics and the solution of boundary-value problems. Applications of finite element analysis and discussion of other software available. Prereq: CHE 603 or permission of instructor; a knowledge of scientific computer programming. 4 cr.

761. Biochemical Engineering
Immobilized enzyme technology, microbial biomass production, transport phenomena in microbial systems, biological reactor design, process instrumentation and control, applications in separation and purification processes. Lab. 4 cr.

772. Physicochemical Processes for Water and Air Quality Control
Origin and characterization of pollutants. Controls, including filtration, sedimentation, coagulation and flocculation, absorption and adsorption. Applied fluid mechanics, mass transfer, and kinetics. Thermal pollution, chemical treatment, oil spills on water, and aeration. Lab. 4 cr.

Chemistry (CHEM)

(For program description, see page 55.)

Chairperson: Howard R. Mayne
Professors: Christopher F. Bauer, N. Dennis Chasteen, Richard P. Johnson, Howard R. Mayne, W. Rudolf Seitz, Gary R. Weisman, Edward H. Wong
Research Professor: Vernon N. Reinhold
Associate Professors: Roy Paul Planalp, Sterling A. Tomellini, Charles K. Zercher
Assistant Professors: Julius C. Fister, Glen P. Miller
Research Assistant Professor: Bruce B. Reinhold
Faculty-in-Residence, Assistant Professor: John N. Beauregard

#*401-402. Introduction to Chemistry
Elementary, broad view of chemistry; emphasizes topics related to everyday life. For students who do not intend to take any other chemistry courses,

* Students receive credit for only one course from 401, 403, 405, and 409, and for only one course from 402 and 404.

and those interested in satisfying a science requirement. Not a prerequisite for any other chemistry courses. Lab. 4 cr. (Not offered every year.)

***403-404. General Chemistry**
Fundamental laws and concepts applied to nonmetals, metals, and their compounds. For students who plan to take further chemistry courses. Previous chemistry recommended. Knowledge of algebra, exponentials, and logarithms required. Special fee. Lab. 4 cr.

***405. General Chemistry**
Basic principles; atomic structure, bonding, equilibria, and thermodynamics. First course for chemistry majors. Prereq: one year of high school chemistry, algebra, and knowledge of exponentials and logarithms. Cannot be taken for credit if credit received for CHEM 403-404. Special fee. Lab. 4 cr.

406. Quantitative Analysis
Studies of pollution, environmental problems, and the more traditional professional work in chemistry rely heavily on a sound knowledge of analytical chemistry. Gravimetric and volumetric analysis, potentiometry, spectrophotometry, and selected separations methods. Prereq: CHEM 404 or 405. Coreq: CHEM 407. 3 cr.

407. Quantitative Analysis Laboratory
Gravimetric and volumetric analysis; chemical separations; potentiometry and spectrophotometry. Treatment of data, error analysis, and calculation of results. Coreq: CHEM 406. Special fee. 2 cr.

***409. Chemistry and Society**
Elementary survey of chemistry; integrates principles and applications. For students who do not intend to take any other chemistry courses and those interested in satisfying a general education science requirement. Not a prerequisite for any other chemistry course. Lab. 4 cr. (Not offered every year.)

517. Quantitative Analysis
For students planning careers in medicine, dentistry, plant and animal science, nursing, oceanography, and environmental science. Volumetric methods, separations, and instrumental methods. Prereq: CHEM 404 or 405. Coreq: CHEM 518. 3 cr.

518. Quantitative Analysis Laboratory
Volumetric methods with an emphasis on technique; separations; and selected instrumental methods such as potentiometry, spectrophotometry, atomic absorption, and gas chromatography. Coreq: CHEM 517. Special fee. 2 cr.

545. Organic Chemistry
Introductory study of carbon compounds for those who desire a brief terminal course. Prereq: CHEM 404 or 405. Coreq: CHEM 546. Students receiving credit for CHEM 545 may not receive credit for CHEM 402, 547-548, or 651-652. 3 cr.

546. Organic Chemistry Laboratory
Coreq: 545. Special fee. 2 cr.

547-548. Organic Chemistry
Principal classes of organic compounds, aliphatic and aromatic; class reactions and structural theory. Intended primarily for chemistry and biochemistry majors. Prereq: CHEM 404; 405;/or permission. Coreq: CHEM 549-550. Students receiving credit for CHEM 547-548 may not receive credit for either CHEM 545 or 651-652. 3 cr.

549-550. Organic Chemistry Laboratory
Coreq: 547-548. Special fee. Lab. 2 cr.

574. Introduction to Inorganic Chemistry
Elementary concepts including periodicity, descriptive chemistry of metals and nonmetals, and coordination compounds. Prereq: CHEM 404; 405;/or permission. 3 cr.

651-652. Organic Chemistry
Principal classes of organic compounds, aliphatic and aromatic, class reactions and structural theory. Intended primarily for prehealing arts, biological science, and health science students. Prereq: CHEM 404; 405;/or permission. Coreq: CHEM 653-654. Students receiving credit for CHEM 651-652 may not receive credit for either CHEM 545 or 547-548. 3 cr.

653-654. Organic Chemistry Laboratory
Coreq: 651-652. Special fee. 2 cr.

683-684. Physical Chemistry I, II
The properties of gases, liquids, and solids; thermochemistry and thermodynamics; solutions, chemical equilibria, reaction rates, conductance, and electromotive force. Prereq: CHEM 404 or 405; MATH 426. Pre- or coreq: PHYS 402 or 407. Coreq: CHEM 685-686. 3 cr.

685-686/686W. Physical Chemistry Laboratory**
Measurement of thermodynamic properties, chemical kinetics, and methods of determining the structure of matter. Prereq: CHEM 404 or 405; MATH 426. Pre- or coreq: PHYS 407 or 402. Coreq: CHEM 683-684. 686W is writing intensive. Special fee. 2 cr.

696. Independent Study
For exceptional students. Individual reading, writing, or laboratory work carried out under the tutelage of a faculty member. May be used to replace specific required courses in chemistry. Prereq: approval of the adviser and department chairperson. Credits to be arranged.

698. Seminar
Student reports on topics of interest. Prereq: CHEM 548 or 652; CHEM 684. 1 cr.

699. Thesis
Yearlong investigation in a selected topic, with background and experimental investigation. For chemistry majors who have completed CHEM 548, 684, and 762. Required for B.S. majors. Strongly recommended for B.A. chemistry majors. Prereq: 2.50 average or permission. Lab. Two semesters of 4 cr. each are required. Writing intensive. 4 cr./semester.

708. Spectroscopic Investigations of Organic Molecules
Survey of the use of modern spectroscopic techniques for the identification and structural and dynamic characterization of organic compounds. Topics include proton and carbon-13 nuclear magnetic resonance spectroscopy, infrared spectroscopy, and mass spectroscopy. Problem solving is emphasized. 1–4 cr.

755. Advanced Organic Chemistry
Methods of synthesis and determination of structure, including stereochemistry of complex organic compounds. Prereq: CHEM 548 or 652 or equivalent. Coreq for CHEM majors: 756. 3 cr.

756/756W. Advanced Organic Chemistry Laboratory
Synthesis and structural determination of complex organic compounds, techniques for the separation, determination of purity, and identification of compounds by spectroscopic and chemical means. Coreq for CHEM majors: 755. 756W is writing intensive. Special fee. 3 cr.

762. Instrumental Methods of Chemical Analysis
Theory, instrumentation, and application of methods such as atomic absorption, coulometry, emission spectrography, gas and liquid chromatography, polarography, potentiometry, IR and UV–VIS absorption spectrophotometry, and mass spectrometry to chemical analysis. Prereq: CHEM 406 or 517; CHEM 684 as a pre- or corequisite;/or permission. Coreq: CHEM 763. 3 cr.

763/763W. Instrumental Methods of Chemical Analysis Laboratory
Experimental parameters, error analysis, and applications of the methods covered in CHEM 762. Coreq: CHEM 762. 763W is writing intensive. Special fee. 2 cr.

774. Inorganic Chemistry
Basic theoretical concepts and their applications to inorganic reactions and compounds. Prereq: organic chemistry; physical chemistry;/or permission. Coreq: CHEM 775. 3 cr.

775/775W. Inorganic Chemistry Laboratory
Synthesis and characterization of inorganic compounds with an emphasis on techniques not taught in other laboratory courses. Coreq for undergraduates: CHEM 774. 775W is writing intensive. Special fee. 2 cr.

776. Physical Chemistry III
Application of quantum theory to atomic electron structure, spectroscopy, and molecular structure. Prereq: CHEM 683-684. Special fee. Lab. 4 cr.

#778. Chemistry of Large Molecules
Basic chemistry of high-molecular-weight compounds, including synthetic polymers and substances occurring in living systems. Elementary aspects of the structures, syntheses, and properties of large molecules, and their roles in modern science, technology, and living systems. Prereq: one semester of organic chemistry. 4 cr. (Not offered every year.)

795. Special Topics in Chemistry
New or specialized topics not covered in regular course offerings. May be repeated to a maximum of 4 credits. Prereq: permission. 2–4 cr.

Chinese (CHIN)

401-402. Elementary Chinese
Aural-oral practice in meaningful contexts of the fundamental vocabulary and grammar of Mandarin Chinese. Reading and writing in romanization (pinyin) and in Chinese characters. 4 cr.

#503-504. Intermediate Chinese
Continuation of CHIN 401-402. Conducted entirely in Chinese, with work on listening comprehension, speech, reading, and writing of Chinese characters, with increasing attention to reading contemporary Chinese texts. 4 cr.

Civil Engineering (CIE)

(For program description, see page 56.)

Chairperson: Thomas P. Ballestero
Professors: Jean Benoit, Michael R. Collins, Pedro A. de Alba, David L. Gress, Nancy E. Kinner, Paul J. Ossenbruggen
Associate Professors: Thomas P. Ballestero, Charles H. Goodspeed, Robert M. Henry, James P. Malley
Research Associate Professor: T. Taylor Eighmy
Assistant Professors: Raymond A. Cook, Robert E. Steffen
Research Assistant Professor: Larry K. Brannaka

400. Civil Engineering Lectures
Introduction to the profession; the civil engineer as a planner, builder, and problem solver; and the goals of the civil engineering curriculum. Introduction to concepts of integrated design, engineering ethics, and technical writing. Lectures by faculty and visitors. Introduction to word processing and spreadsheet software. Field trips to construction sites. Required of CIE first-year students; open to others by permission. 1 cr. Cr/F.

505. Surveying
Principles of land measurements by ground and photogrammetric methods. Application of error theory to planning and adjusting engineering surveys. Conformal mapping and its applications to state plane coordinate systems. CIE majors or permission. Coreq: MATH 426 or permission. Special fee. Lab. Writing intensive. 4 cr.

528. Mechanics I
Introduction to statics and particle dynamics and rigid body dynamics. Two- and three-dimensional force systems; the concept of static and dynamic equilibrium; rotational and translational kinetic energy of rigid bodies; friction; momentum and impulse principles; analysis of trusses and beams, centroids, development of moment and shear diagrams. Prereq: MATH 425, 426; PHYS 407. 4 cr.

529. Mechanics II
Introduction to strength of materials, virtual work, work-energy relationships. Analysis of members under bending, torsion, axial loads; diagrams; stresses and strains; stability of columns. Prereq: CIE 528. 4 cr.

530. Introduction to Civil Engineering Applications
Introduction to the solution of civil engineering problems using computer applications; regression analysis, curve fitting, numerical integration, statistics, roots of equations, spreadsheets, databases, CAD, and an introduction to engineering drawings. Emphasis on use of computers as an engineering tool, and how to verify results obtained from a computer analysis. Prereq: CIE 400; 528;/ or permission. Special fee. 3 cr.

622. Engineering Materials
Structural properties and applications of the various materials used in civil engineering projects, including steel, cement, mineral aggregates, concrete, timber, and bituminous materials. Microstructure and properties of common metals, plastics, and ceramics. Prereq: CIE 529; CIE major or permission. Special fee. Lab. Writing intensive. 4 cr.

633. Systems Analysis
Techniques for modeling and analysis of engineering systems. Topics include economic evaluation, optimization, and system variability and uncertainty. Pre- or coreq: MATH 527 and 644; CIE major or permission. 3 cr.

642. Fluid Mechanics
Properties of fluids, fluid statics, continuity, momentum and energy equations, resistance to flow, boundary layer theory, flow in open channels and piping systems, dimensional analysis, similitude, drag, and lift. Laboratory exercises on measurement of fluid properties, energy principles, flow resistance, discharge measurements, momentum, hydropower, groundwater flow, and settling of spheres. Prereq: CIE 528, 529; CIE major or permission. Special fee. Lab (meets every other week, opposite CIE 665 labs). 4 cr.

665. Soil Mechanics
Soil classification and physical properties. Permeability, compressibility, consolidation, and shearing resistance are related to the behavior of soils subjected to various loading conditions. Coreq: CIE 642; CIE major or permission. Special fee. Lab (meets every other week, opposite CIE 642 labs). 4 cr.

681. Classical Structural Analysis
Analytical stress and deflection analysis of determinate and indeterminate structures under static and moving loads by classical methods. Prereq: CIE 528-529; CIE major or permission. 3 cr.

#695. Civil Engineering Projects
Independent research, under faculty guidance, of a subject of particular interest to an individual or a small group. Prereq: approval of faculty member involved. 2–4 cr.

#696. Civil Engineering Field Experience
Based on appropriate career oriented work experience. Student can get one credit per experience and can be repreated for a total of three credits. A written final report is required as well as permission of student's adviser. 1 cr.

#697. Civil Engineering Internship
Off-campus work in the civil engineering field for on-the-job skill development. Needs to be supervised by a civil engineering faculty member and a proposal for the internship must be submitted and approved by the department prior to the start of the internship. 2–4 cr. IA.

721. Pavement Design
Flexible and rigid pavements and bases for highways, airports, city streets, and industrial floors; pavement selection, construction methods, materials, specifications. Prereq: CIE 665 or permission. 3 cr.

722. Properties and Production of Concrete
Basic principles of hydraulic cements and mineral aggregates, and their interactions in the properties of plastic and hardened concrete; modifications through admixtures; production handling and placement problems; specifications; quality control and acceptance testing; lightweight, heavyweight, and other special concretes. Prereq: CIE 622 or permission. 3 cr.

723. Bituminous Materials and Mixtures
Considerations of major types of bituminous materials, asphalt cements, cutback asphalts, asphalt emulsions, and tars; influence of chemical composition on physical properties; desirable aggregate characteristics for bituminous mixtures; construction techniques; current practices for determining optimum asphalt contents. Prereq: CIE 622 or permission. 3 cr.

#734. Project Analysis
Methods of analysis for decision making used in the planning, design, and management of various engineering systems involving chance and uncertainty. Topics in applied probability and statistics are used for risk analysis and for investigating system performance and reliability. Prereq: CIE 633, MATH 644, or permission. 3 cr.

741. Open Channel Flow
Energy and momentum principles in open channel flow; flow resistance; channel controls and transitions; unsteady open channel flows; and basic modeling techniques using program HEC-2, unsteady flow concepts and dam failure studies. Prereq: CIE 642 or permission. 3 cr.

745. Engineering Hydrology
Hydrologic cycle, probability theory related to hydrology and the design of water resources structures, water law, flood discharge prediction, hydrograph development, hydraulic and hydrologic river routing, reservoir routing, theory of storage, reservoir operations, hydropower development, modeling of watershed hydrology with program HEC-1, multipurpose projects. Prereq: CIE 642 or permission. 3 cr.

754. Transportation Engineering and Planning
Fundamental relationships of traffic speed, density, and flow applied to public and private modes of transport. Principles of demand forecasting and urban systems planning. Prereq: permission. 4 cr.

755. Design of Water Transmission Systems
Pressure, sewer, and open channel system design. Theory developed for individual components to large complex systems. Topics include: closed conduit flow, open channel flow, groundwater flow, valves and meters, pump selection, system planning and layout, and system operation and maintenance. Pressure system modeling with program EPANET. Rainfall runoff calculations with US SCS TR55 model. Prereq: CIE 642 or permission. 4 cr.

757. Coastal Engineering and Processes
Introduction to small amplitude and finite amplitude wave theories. Wave forecasting by significant wave and wave spectrum method. Coastal processes and shoreline protection. Wave forces and wave-structure interaction. Design of coastal structures. Introduction to mathematical and physical modeling. Prereq: CIE 642 or permission. 3 cr.

760. Foundation Design I
Foundation design based on subsurface investigation and characterization using current methods of laboratory and in situ testing. Use of consolidation theory and bearing capacity theory for the design of shallow foundations including footings and rafts. Basic design of pile foundations. Earth pressure theory applied to design of retaining walls. Slope stability theory and applications. Prereq: CIE 665 or permission. 4 cr.

761. Foundation Design II
Advanced pile and pier design under vertical and lateral loads. Slope stability by circular and noncircular arc methods. Design of flexible bulkhead walls and mechanically stabilized walls. Excavation and dewatering. Soil and site improvement. Prereq: CIE 760 or permission. 3 cr.

762. Introduction to Geotechnical Earthquake Engineering
Overview of earthquake source mechanisms; magnitude and intensity; seismicity of the U.S. Dynamics of simple structures; response spectra. Selection of design parameters; source, magnitude, input records. Measurement of dynamic characteristics of soils; site response, liquefaction, and ground deformation. Prereq: CIE 760 or permission. 3 cr.

763. Geological Engineering
Functional classification of rocks and rock masses. Stereographic projection. Engineering properties of rocks. Rock mechanics. The influence of geology in the design of underground excavations, tunneling, foundations, and rock slope engineering. Prereq: ESCI 401 or permission. 3 cr.

766. Introduction to Geo-Environmental Engineering
Geo-environmental site characterization and investigation using in situ geotechnical and geophysical methods; ground water, soil and gas monitoring and sampling; containment design including landfills, geosynthetics for liners and covers, leachate collection systems, vertical cutoff walls and stability analyses; remediation techniques such as stabilization, bioremediation and electrical methods. Prereq: CIE 760 or permission. 3 cr.

774. Reinforced Concrete Design
Introduction to the design of reinforced concrete structural members by the strength method and considering deflection performance. Includes loads, approximate analyses, slabs, beams, and columns. Prereq: CIE 681 or permission. 4 cr.

#778. Issues in Engineering Practice and Management
Nontechnical professional engineering topics including: participation in multidisciplinary teams, interpersonal and human resources skills, verbal and written communication skills, project management, marketing, ethics, professional licensure, professional liability, and contract administration. Prereq: seniors and graduate students only; juniors with permission. 3 cr.

782. Timber Design
Properties and characteristics of structural woods, mechanics of wood, connection methods, design of timber members, and connections in beams, columns, and trusses, and glued laminates of wood. Prereq: CIE 681 or permission. 3 cr.

783. Matrix Structural Analysis and Modeling
Modeling and analysis of determinate and indeterminate structures; nonprismatic members subject to static and moving loads. Solution by matrix and computer-applied methods. Determination of appropriate loading conditions, study of wind and earthquake loads, and introduction to engineering drawings. Prereq: CIE 681 or permission. 3 cr.

784. Civil Engineering Analysis with Numerical Techniques
Unifying concepts of civil engineering analysis, theory, and numerical techniques. Discussion includes assumptions required by numerical techniques and their relationship to the theory and analytical results. Prereq: permission. 3 cr.

785. Introduction to Structural Vibrations
Dynamic analysis of single- and multi-degree-of-freedom systems. Simple beam and frame structures. Earthquake analysis and design. Pre- or coreq: CIE 783. 3 cr.

786. Introduction to Finite Element Analysis
Topics include basic matrix theory, Galerkin method, direct stiffness method, development of finite element theory, and modeling techniques, applications in solid mechanics, heat transfer, fluids, and dynamics using commercially available codes. Prereq: CIE 681; 783;/or permission. 3 cr.

787. Dynamics of Structures
Dynamics of single- and multi-story buildings. Response due to earthquakes, blasting, traffic, and mechanical equipment. Analysis in the time domain and through the Fourier Transform. Fundamentals of structural vibration measurement. Prereq: CIE 785 or permission. 3 cr.

788. Project Planning and Design
Student groups will be formed into design teams to prepare a design plan for a large-scale civil engineering system including consideration of budgetary constraints, building code criteria, and environmental impacts. Each team prepares a final written report and gives a formal presentation. Prereq: senior CIE major or permission. Writing intensive. 4 cr.

789. Project Management
Project management concepts including labor, material and equipment usage; cost estimation; financing and economic evaluation of projects; scheduling; and quality control and safety during construction. Existing projects are integrated in class discussions and homework. An understanding of CIE 633 topics is assumed. 3 cr.

791. Prestressed Concrete
Design of prestressed and post-tensioned concrete sections in flexure and shear. Prestressing systems and ultimate strength methods are introduced. Prereq: CIE 774 or permission. 3 cr.

792. Introduction to Bridge Design
Introduction to the AASHTO LRFD Bridge Design Specifications using SI units. Design objectives, loads, load case analysis and selection, load distributions, static analysis, and design for axial loads, flexure, and shear. Design of slender columns, composite beams, and plate girders. Prereq: CIE 774 or 874 or permission. Coreq: CIE 793 or 893. 3 cr.

793. Structural Design in Steel
Design of members and connections: tension and compression members, beams, plate girders; riveted, bolted, and welded joints. Introduction to plastic design of beams and frames. Prereq: CIE 681 or permission. 3 cr.

795-796. Independent Study
A limited number of qualified seniors will be permitted to pursue independent studies under faculty guidance. Seniors may write terminal theses reporting the results of their investigations. May be repeated. 1–4 cr.

Classics (CLAS)

Department of Languages, Literatures, and Cultures
(See department note, page 31; program description, page 33; faculty listing, page 178; see also course listings under Greek and Latin.)

Coordinator: Richard V. Desrosiers

401. Classical Mythology
Survey of myths and sagas of ancient Greece and Rome. No classical preparation necessary. Background course for majors in English, the arts, music, history, modern languages, classics. Special fee. 4 cr.

402. Hellenic and Roman Institutions
Lecture, discussion. Introduction to ancient Greek and Roman literature. Emphasis on the institutions from the earliest period to the end of the classical age. Open to all students. 4 cr.

#411-412. Elementary Hittite
Elements of grammar, reading of simple prose. Special fee. 4 cr.

413-414. Elementary Sanskrit
Elements of grammar, reading of simple prose. Special fee. 4 cr.

421. Major Greek Authors in English
Major classical authors such as Homer, the Tragedians of Athens, Herodotus, Thucydides, and Plato in the context of their civilization, from which so much of our contemporary culture derives. For students unprepared to read Greek. Background for majors in English, history, Latin, Greek, the arts, music, philosophy, modern languages. Open to all students. Writing intensive. 4 cr.

422. Major Roman Authors in English
Major classical authors such as Plautus, Terence, Cicero, Catullus, Vergil, Ovid, Seneca, Juvenal, and Tacitus in the context of their civilization, from which so much of our contemporary culture derives. For students unprepared to read Latin. Background for majors in English, philosophy, history, Latin, Greek, the arts, music, modern languages. Open to all students. Writing intensive. 4 cr.

500. Classical Mythology-Topics in World Literature
Topics will be chosen which introduce students to major themes and genres. (Also offered as FREN 500, GERM 500, ITAL 500, PORT 500, RUSS 500, SPAN 500, WLCE 500.) May be repeated for credit. Writing intensive. 4 cr.

#503. Cicero and the Roman Republic
Introduction to the political background of Cicero's career and study of the role played by the greatest of Roman orators in the constitutional crisis of the last century of the Republic. Open to all students. Writing intensive. 4 cr.

#504. The Augustan Principate
A study of the early Roman Empire as created by Augustus and his immediate successors; glorified by Vergil, Horace, and the poets of the Golden Age; and described by Tacitus, Suetonius, and the prose writers of the Silver Age. Open to all students. Writing intensive. 4 cr.

506. Introduction to Comparative and Historical Linguistics
Major language families (primarily Indo-European) and the relationships among languages within a family. Diachronic studies; methods of writing; linguistic change; glottochronology; etymological studies. Some language training and LING 505 desirable. (Also offered as LING 506.) 4 cr.

521, 522. Masterpieces of Greco-Roman Culture in English
More advanced study of the writings of classical civilization centered on a single theme and taught

in the Socratic method. For students with some classical preparation, although no knowledge of the Greek and Latin languages is required. Background for prelaw students as well as majors in English, history, Latin, Greek, modern languages, and political science. Writing intensive. 4 cr.

525. Greek and Latin Origins of Medical Terms
Study of medical terminology. Exercises in etymology and the development of vocabulary in a context at once scientific, historical, and cultural. No knowledge of Greek or Latin is required. Useful to premedical, predental, preveterinary, nursing, medical technology, and other students in the biological and physical sciences. Open to all students. 4 cr.

#595, 596. Topics in Classics
Introduction and elementary study related to linguistic study of Latin and Greek or relevant to Greco-Roman culture and history. Primarily for students unprepared to read Latin and Greek. Topics: A) Byzantine Heritage; B) Grammar: Comparative Study of English and the Classical Languages; C) Greek and Latin Origins of Legal Terms; D) Greek and Latin Origins within the English Language; E) Classical Backgrounds of Modern Literature; F) Classical Archaeology. 4 cr.

695, 696. Special Studies in Classics
Advanced work in classics. Research paper. Not open to freshmen and sophomores. 2 or 4 cr.

Communication (CMN)

(For program description, see page 33.)

Chairperson: Sheila McNamee
Professors: Sheila McNamee, Joshua Meyrowitz, John D. Shotter
Associate Professors: Patrick J. Daley, John N. Erni, James M. Farrell, Beverly James, John Lannamann, Lawrence J. Prelli, Marietta M. Tonn
Assistant Professors: Sally W. Jacoby, Lawrence W. Rosenfield

402. Communication and Social Order
Introduction to human communication from a broad liberal arts perspective; emphasizing the role of symbolic interaction in the construction of social reality. Processes of intrapersonal, interpersonal, group, public, and mass communication. Freshman, sophomore priority. 4 cr.

455. Introduction to Mass Communication
Nature, development, and effects of mass media. Overview of mass communication history and theory. 4 cr.

456. Propaganda and Persuasion
Introduction to theories of propaganda and persuasion. Examination of symbolic strategies designed to secure or resist social and institutional change. Attention given to case studies of social, political, economic, and religious reformation. Special consideration of the ethical ramifications of such efforts. 4 cr.

457. Introduction to Interpersonal Communication
Research and theory that define the area of interpersonal communication. Examination of the associations between communication and such social phenomena as self-concept, social attraction, relationship development, and health. 4 cr.

500. Public Speaking
Performance course buttressed by practical theories of public discourse. Focus on analysis of speaking situations and audiences, message construction, presentation, and critical evaluation. Does not count for credit towards the CMN major. 4 cr.

503. Introduction to Group Process
Focuses on a variety of concepts relevant to the study, analysis, and understanding of communication in the small group setting. Issues include leadership, group roles, problem-solving and decision-making processes in task-oriented groups. Prereq: CMN 457. 4 cr.

504. Introduction to Argumentation
Persuasive discourse as inquiry and advocacy grounded in practical inductive and deductive reasoning. Discovery, analysis, and testing of practical arguments. The nature and function of proof. Some emphasis on applied presentation. Prereq: CMN 456. 4 cr.

505. Analysis of Popular Culture
Locates the development of popular cultural artifacts and practices within the 20th-century social history of the U.S. Examines the political-economic forces that underpinned the commercialization of art, leisure, sports, and other elements of culture in industrial and postindustrial America. Prereq: CMN 455. 4 cr.

#506. Communication as Social Influence
Examines cognitive and social bases of persuasion and social influence from a variety of theoretical perspectives. Focuses on processes of change as applied to face-to-face interaction, group and family settings, and mediated communication. Prereq: CMN 457. 4 cr.

507. Introduction to Rhetorical Theory and Analysis
Major precepts of rhetorical theory. Application of those precepts in analysis and understanding of a wide range of human communication. Consideration of how precepts and issues of rhetorical theory apply to contemporary issues and problems. Prereq: CMN 456. 4 cr.

515. Analysis of News
Explores the psychological, social, economic, political, and cultural factors that influence the definition and reporting of news. Prereq: CMN 455. 4 cr.

519. Advertising as Social Communication
Social role of advertising, public policy debates concerning advertising, influence of advertising on culture, and methods of analyzing advertising messages. Prereq: CMN 455. 4 cr.

#530. Family Communication
Comparison and evaluation of theories of communication developed for the analysis of family interaction. Focus on pattern development and intervention, change, stability, and coherence in family interaction. Prereq: CMN 457. 4 cr.

550. Cinema and Society
The art, history, technology, economics, and theory of moving images from the silent period to the present. Focus on film as a social practice. Examination of both classic Hollywood film and alternative cinema. Prereq: CMN 455. Special fee. 4 cr.

557. Great Speakers and Speeches
Historical survey of masterpieces of oratory from the period of Demosthenes and Cicero through the golden age of American oratory with Lincoln and Webster, to the time of Martin Luther King, John Kennedy, and Ronald Reagan. Critical attention to the circumstances, talents, and rhetorical attributes that combine to make eloquent, persuasive discourse and effective public communication. Prereq: CMN 456. 4 cr.

567. Images of Gender in the Media
The symbolic construction of sexuality and gender in specific social, historical, and cultural settings. Examination of the power to define media images and the media's function as one element in the preservation of gender inequality. Prereq: CMN 455. 4 cr.

#572. Language and Behavior
Focus on language and how a person's, group's, society's, and culture's uses of language are associated with different behavioral patterns and world views. Topics include the relationship of language to social standing, race, minority group membership, gender, and stereotyping. Prereq: CMN 457. 4 cr.

#583. Gender and Expression
Analysis of the different ways people communicate about gender, the different ways men and women communicate, and the consequences of these differences. Prereq: CMN 457. 4 cr.

596. Special Topics in Media Studies
Selected topics not covered by existing courses in media studies. Topics vary; course descriptions are available in department office during preregistration. May be repeated for credit if topics differ. Prereq: CMN 455. 2 or 4 cr.

597. Special Topics in Rhetorical Studies
Selected topics not covered by existing courses in rhetorical studies. Topics vary; course descriptions are available in department office during registration. May be repeated for credit if topics differ. Prereq: CMN 456. 4 cr.

598. Special Topics in Interpersonal Studies
Selected topics not covered by existing courses in interpersonal communication. Topics vary; course descriptions are available in department office during registration. May be repeated for credit if topics differ. Prereq: CMN 457. 4 cr.

599. Internship
Internships are designed to integrate classroom study and supervised practical experience in a work setting. Each student is required to write a series of reports focusing on aspects of the work experience that are related to coursework in the Communication Department. These assignments are designed to enhance a student's ability to reflect critically on the internship experience and to merge theory and practice. Assignments are variable, depending on number of credits granted (1-4). Students are expected to hold the common exam time (TR, 12:40-2) open for occasional meetings. Before starting the internship, students must submit a written proposal to both the work supervisor and the faculty sponsor. The proposal should include detailed information on the duties and responsibilities to be undertaken at the internship site and on the goals and learning objecives as relevant to the Communication Department curriculum. May be repeated for a maximum of 4 credits. Prereq: CMN 455, 456, and 457, or permission. 1–4 cr.

602. Theories of Interpersonal Communication
Analysis and criticism of contemporary perspectives on interpersonal communication. Theories, concepts, issues, and research models are examined as they contribute to our understanding of social interaction. Prereq: any CMN 500-level interpersonal studies course or permission. Writing intensive. 4 cr.

#604. Public Argument in Contemporary Society
Studies of inquiry and advocacy within such contemporary fields as law, politics, science, ethics, business, and the arts. Prereq: any 500-level rhetorical studies course or permission. 4 cr.

605. Argumentation and Public Advocacy
Ideas and methods of adversarial and consensual public advocacy. Applied emphasis on public policy argumentation and decision making. Prereq: any 500-level rhetorical studies course; CMN 500 or 504 recommended. Writing intensive. 4 cr.

607. Persuasion in American Politics
Study of the forms and strategies of persuasive discourse employed by contemporary American political leaders. Analysis of important political addresses of the 20th century, with attention to theoretical and critical issues in political communication and public address. Discussion of the status of rhetoric in modern politics, and the impact of persuasive discourse on campaigns, policy decisions, crisis management, political scandal, and the national identity. Prereq: any 500-level rhetorical studies course or permission. Writing intensive. 4 cr.

615. Public Opinion and Mass Communication
Examines the historical development of the 18th-century public sphere and its relationship to the press. Traces the transformation of the press from an ideological grounding to a commercial base. Analyzes the consequences of contemporary mass consumer-oriented media on the public sphere and democratic life. Prereq: any 500-level media studies course. Writing intensive. 4 cr.

630. Psychology of Communication
Exploration of differing world views in the study of the individual in interaction, with emphasis on how they generate very different conceptions of the human communication process. Specific attention to such notions as the construction of social meaning, the construction of self, and the construction of interactive patterns. Prereq: any 500-level interpersonal studies course or permission. Writing intensive. 4 cr.

#632. Communication Theory
Terminology, concepts, theoretical models, functions, levels, modes and media, and role taking in human communication. Prereq: any 500-level CMN course (three 500-level courses recommended) or permission. Writing intensive. 4 cr.

638. Media and Social Thought
Situates the development of media, public attitudes toward media, and academic study of media within late 19th- and 20th-century social theories, including mass society theory, functionalism-pluralism, and European critical theories. Traces the fragmentation of 19th-century social philosophy into discrete specialized academic disciplines in the 20th century, and discovers the roots of modern media studies in such cognate fields as sociology, psychology, anthropology, and linguistics. Prereq: any 500-level media studies course or permission. Writing intensive. 4 cr.

640. Media, Culture, and Society
Focuses on the construction of meaning in the interplay between social structure and cultural expression. Theory and analysis emphasize the ideological role of the media in the social struggle for meaning. Prereq: any 500-level media studies course or permission. Writing intensive. 4 cr.

642. European Media and Culture
Examination of the mass media in Europe as central sites for the production of culture and the formation of identity. Topics include the structural configurations of the media in European nations, media theories that conceptualize the relationship between the media and their particular political and economic contexts, and policy debates over issues including transborder broadcasting, language preservation, the status of minorities, and the globalization of culture. Prereq: any 500-level media studies course or permission. Writing intensive. 4 cr.

#647. The Rhetoric of Science
Employs rhetorical analysis to examine how science is socially constructed through communication. Investigates persuasive strategies writers and speakers employ to gain approval of ideas as "science" and of themselves as "scientists." Explores strategies used to construct images and ideas about "science" and "scientists" in the popular media, and the influence of these constructed images and ideas on selected political and social issues within society at large. Prereq: any 500-level rhetoric course or permission. Writing intensive. 4 cr.

650. Critical Perspectives on Film
Advanced, focused study of film theory as cultural practice. Topics vary from year to year and with instructor. Focus may range from general considerations of film theory, criticism, and history, to specific analyses of selected genres, directors, national cinemas, and periods. Course descriptions available in department office during preregistration. Prereq: CMN 455; 550, ENGL 533, or permission. Special fee. Writing intensive. 4 cr.

656. Principles of Rhetorical Criticism
Application of critical principles to message evaluation. Consideration of the varying roles, methods, and standards of rhetorical critics. Special attention to major perspectives on rhetorical criticism including neo-Aristotelian, historical, dramatistic, generic, literary, and psychological. Prereq: any 500-level rhetorical studies course (CMN 507 recommended). Writing intensive. 4 cr.

657. Public Address and the American Experience
Study of persuasive texts set firmly in their historical and social contexts. Discussion of the impact of popular discourse on historically significant political and social events. Analysis of how leading persuasive speakers and writers responded to the fundamental questions confronting their age and articulated ideas in a manner that provoked or motivated their community, state, or nation. Historical period studied will vary. May be repeated for credit when topic varies. Prereq: 500-level rhetorical studies course or permission. Writing intensive. 4 cr.

658. Media Analysis and Criticism
Approaches and methodologies for media criticism. Analysis of sample studies. Students work on original media analysis projects. Prereq: any two 500-level CMN courses (three 500-level courses recommended) or permission. Writing intensive. 4 cr.

666. Conversation Analysis
Exploration of how participants in interpersonal communication display their orientation to the fundamental orderliness of conversational sequences in everyday, institutional, and mass media settings. Basic concepts covered include the interactional co-construction of turn-taking, repair, overlap, openings, closings, silences, adjacency pairs, disagreement, preference, and the role of various linguistic, paralinguistic, and nonlinguistic features in the conversation process. Prereq: CMN 457 and 1 500-level interpersonal CMN course or permission. Writing intensive. 4 cr.

667. Ethnography of Communication
Theoretical and hands-on consideration of interpersonal communication and language use as culturally situated practices of particular communities, through which human beings reflect, construct, maintain, pass down, and challenge the cultures of which they are a part. Students will learn how to interpret culturally situated interpersonal communication and language use by employing various ethnographic and discourse analytic methods of investigation. Prereq: CMN 457 and 1 500-level interpersonal course or permission. Writing intensive. 4 cr.

#670. Systems and Theories of Rhetoric
Critical interpretation of significant works in the history of rhetorical theory and the major philosophical systems underlying them. Selected contemporary theories of rhetoric examined as they relate to classical perspectives. Explores fundamental philosophical and theoretical questions asked by rhetorical theorists and several responses to those questions. Prereq: any 500-level rhetorical studies course (CMN 597 recommended). Writing intensive. 4 cr.

672. Theories of Language and Discourse
Focus on different theoretical orientations to the study of language and specific models for analyzing conversation. Specific issues include conversational rules and coherence, turn taking, narrative development and analysis, speech act analysis, accounts analysis, and conversational analysis. Prereq: any 500-level interpersonal studies course (CMN 572 recommended) or permission. Writing intensive. 4 cr.

680. Perspectives on Culture and Communication
Theoretical and practical problems of intercultural communication. Explores how communication transactions create, maintain, and separate different cultures. Prereq: any 500-level interpersonal studies course or permission. Writing intensive. 4 cr.

696. Communication Seminar in Media Studies
Variable topics in media research, theory, and practice. May be repeated for different topics. Topic descriptions available in department office during preregistration. Prereq: any 500-level media studies course or permission. Writing intensive. 4 cr.

697. Communication Seminar in Rhetorical Studies
Variable topics in rhetorical research, theory, and practice. May be repeated for different topics. Topic descriptions available in department office during

preregistration. Prereq: any 500-level rhetorical studies course or permission. Writing intensive. 4 cr.

698. Communication Seminar in Interpersonal Studies
Variable topics in interpersonal research, theory, and practice. May be repeated for different topics. Topic descriptions available in department office during preregistration. Prereq: any 500-level interpersonal studies course or permission. Writing intensive. 4 cr.

#701. Modes of Communication Inquiry
Overview of selected philosophical orientations, issues, and concepts central to communication research. Examination of both qualitative and quantitative methods. Prereq: two 500-level CMN courses or permission. Writing intensive. 4 cr.

702. Seminar in Interpersonal Communication Theory
In-depth concentration on a particular theoretical orientation in interpersonal communication. Original works are read. Theoretical orientation varies by semester. Theories covered include rule theories, systems theories, individual difference theories, symbolic interactionism, constructivism, hermeneutics, phenomenology, cybernetics, etc. Prereq: three 500-level CMN courses with at least one in interpersonal studies or permission. Writing intensive. 4 cr.

703. Seminar in Rhetorical Theory
Focused study of problems in rhetorical theory construction through examination and criticism of selected theoretical frameworks used to explain or interpret rhetorical phenomena. Prereq: permission. Writing intensive. 4 cr.

772. Seminar in Media Theory
Detailed analysis of major theories related to the interaction of communication technologies and society. Application to current examples in politics, advertising, and entertainment. Prereq: at least one 600-level course or permission. Writing intensive. 4 cr.

795. Independent Study
Advanced individual study in rhetoric, media, or interpersonal communication. Project to be developed with supervising instructor. May be repeated for credit. Prereq: permission. Variable to 4 cr.

799H. Honors Thesis
Written thesis based on substantial and original research under the direction of a full-time member of the communication faculty. Thesis must be in the form and style of a publishable, scholarly work. Restricted to seniors seeking honors in major. 4 cr.

Communication Disorders (COMM)

(For program description, see page 67.)

Chairperson: Stephen N. Calculator
Professor: Stephen N. Calculator
Associate Professors: Steven P. Bornstein, Frederick C. Lewis, Penelope E. Webster
Adjunct Associate Professors: Linda Vallino Napoli, John M. O'Day, Marjorie Korff Stock
Assistant Professors: Sheryl Gottwald, Christine G. Guarino, Jeanne H. O'Sullivan, Amy S. Plante
Research Assistant Professor: Rae M. Sonnenmeier
Faculty-in-Residence, Assistant Professor: Ruth E. Peaper
Adjunct Assistant Professors: Karen Lucas, Lygia Soares
Adjunct Instructors: Anne Hall Eiseman, Mark Windt

520. Survey of Communication Disorders
Causes, diagnosis, and treatment of speech, language, and hearing disorders. 4 cr.

521. Anatomy and Physiology of the Speech and Hearing Mechanisms
Anatomy, physiology, neurology, and function of the mechanisms for the production and perception of speech. 4 cr.

522. The Acquisition of Language
Introduction to normal language acquisition; stages of children's developing language examined within a linguistic framework with attention paid to syntax, morphology, phonology, semantics, and pragmatics. Theories of language acquisition overviewed. 4 cr.

523. Clinic Observation
Formal observation of diagnosis and therapy being conducted for individuals with a variety of communication disorders. Prereq: COMM 520. Writing intensive. 1 cr. Cr/F.

524. Clinical Phonetics
Application of the International Phonetic Alphabet to normal and clinical populations; use of broad and narrow transcriptions. Basic speech science, acoustic phonetics, and acoustic analysis of speech production. 4 cr.

533. Elementary American Sign Language
Introduction to the vocabulary, finger spelling, grammatical processes, phonology, syntax, and semantics of American Sign Language. Emphasis on applying principles of sign language; psychosocial aspects of deafness, and the deaf person as bilingual; grammatical processes that modulate meaning of sign in discourse; development of receptive language skills. 4 cr.

630. Organic Pathologies
Neurological bases, diagnosis, and treatment of communication disorders; emphasis on motor speech disorders and aphasia. Prereq: permission. 4 cr.

631. Articulation and Language Disorders in Children
Research, diagnosis, and therapy procedures as applied to articulation and language disorders. 4 cr.

634. Introduction to Clinical Procedures
Clinical procedures and client management. Treatment techniques for disorders of articulation and language. Parent interview and counseling, facilitating target behaviors, and report writing. History, requirements and governance of the profession. Prereq: COMM 631. 4 cr.

#660. Special Problems in Communication Disorders
Individual or group projects to enrich or expand theoretical knowledge and to afford an opportunity for applied experience.May be repeated to a maximum of 8 credits. Prereq: permission and arrangement with faculty. 2, 4, 6, or 8 cr.

704. Basic Audiology
Normal hearing process and pathologies of the auditory system. Hearing screening, pure-tone testing, and speech audiometry. Prereq: COMM 521 or permission. 4 cr.

705. Introduction to Auditory Perception and Aural Rehabilitation
Research, testing, and clinical procedures of auditory perception, applied to the communicatively impaired. Prereq: COMM 704; permission. 4 cr.

733. Intermediate American Sign Language
Emphasis on the advanced linguistic principles of American Sign Language including idioms slang and its place in the communication pattern of the deaf. Improvement of speed and accuracy in receptive and expressive skills for communicating with the deaf. Educational and vocational problems associated with deafness. Prereq: COMM 533 or its equivalent; juniors and seniors only. 4 cr.

777. Speech and Hearing Science
Physical, acoustical, and perceptual correlates of normal speech production and audition. Includes theoretical models with the generation, transmission, detection, and analysis of speech signals. 4 cr.

795. Independent Study
Individual or group projects involving directed study of an area of communication disorders which students wish to explore in greater depth than is covered in the required curriculum. May be repeated to a maximum of 8 credits. Prereq: permission. 2, 4, 6, or 8 cr.

Community Development (CD)

Department of Resource Economics and Development
(For program description, see page 84.)

Coordinator: Edmund F. Jansen, Jr.
Professors: John M. Halstead, Edmund F. Jansen, Jr., Bruce E. Lindsay
Associate Professors: Douglas E. Morris, Robert A. Robertson
Adjunct Assistant Professor: Lynda Brushett

415. Community Development and Perspectives
Introduction of the concepts of community development and issues that are facing contemporary communities as they undergo change. Focus on strengthening communities through a process of citizens participation and decision making which empowers citizens to direct and control change that affects their lives in the local community. Emphasis given to the roles and responsibilities of professional administrators and individual citizens in the dynamic process of community policy formulation, decision making, and administrative implementation. 4 cr.

508. Applied Community Development
Students work in an actual community, assisting individuals and groups to identify needs and problems, establish attainable and objective goals, assess requirements and resources, and formulate programs for development; methods of collection, analysis, and integration of pertinent primary and secondary economic, social, political, and physical data for community development. Prereq: CD 415 or permission. Lab. 4 cr.

607. Community Administration and Development
Principal theories and methods of community administration and development; skills required for professional and citizen volunteers who are involved in decision making and administrative activities in local communities. Emphasis on the responsibilities and strategies of individuals working in the field of local public administration. Prereq: CD 415 or permission. 4 cr.

614. Community Planning
Community planning process in nonmetropolitan communities; practical application of planning techniques. Community components: housing, jobs, schools, recreation, transportation, community appearance, and the administrative structure for planning. Use of planning tools: data gathering and analysis, the master plan, zoning and subdivision regulations, community development programs. Prereq: EREC 411; CD 415;/or permission. 4 cr. (Offered every other year.)

627. Community Economics and Finance
Economic and financial factors affecting community and local government decisions. Emphasis on use of economic theory and analytical techniques to evaluate problems in contemporary New England communities and towns. Prereq: EREC 411 or ECON 402. (Also offered as EREC 627.) 4 cr. (Offered every fourth semester.)

#710. Community Development Seminar
Seminars arranged to students' needs and offered as demand warrants: in-depth treatment of area, including classic works. May be repeated. 2–4 cr.

717. Law of Community Planning
Common law and the constitution with respect to property law, including eminent domain, land-use planning, urban renewal, and zoning. Makes the nonlawyer aware of the influence and operation of the legal system in community development. 4 cr. (Offered every other year.)

741. Critical Issues in Solid Waste Management
Overview of the basic issues in managing society's waste, focusing on municipal solid waste and sewage sludge or "biosolids." Issues such as recycling, source reduction, composting, incineration, land spreading, and land filling examined from different disciplines. Five basic modules: agronomy, economics, engineering and hydrology, planning and policy, and social/cultural/ethical issues. Guest speakers from state government, private sector firms, nonprofit and environmental groups, and the New Hampshire legislature featured selectively. Field trips to waste management sites, such as landfills, recycling centers, and composting operations. Prereq: EREC 411 or equivalent; BIOL 412 or equivalent;/or permission. (Also offered as RAM 841). 2 cr.

777. Fundamentals and Practice of Community Planning
Advanced treatment of the concepts and tools required for effective local and regional planning to guide land use, capital investment in infrastructure, and organization for service delivery. Prereq: CD 614 or permission. 4 cr. (Offered every other year.)

793. Community Administration Internship
Fieldwork in governmental agency or a local government unit for on-the-job skill development. Normally supervised by a qualified administrator in the organization with frequent consultation with a faculty sponsor. A written report is required. Internship may be part- or full-time with course credits assigned accordingly. Prereq: permission. 1–8 cr.

794. Community Planning Internship
Fieldwork in a public planning office or agency for on-the-job skill development. Normally supervised by a qualified planner in the planning organization with frequent consultation with a faculty sponsor. A written report is required. Internship may be part- or full-time with course credits assigned accordingly. Prereq: permission. 1–8 cr.

795, 796. Investigations in Community Development
Special assignments in readings, investigations, or field problems, or teaching experience. May be repeated. Prereq: permission. 2–4 cr.

797. Community Administration and Planning Seminar
Selected topics in community administration and in community and regional planning. Focusing on current issues of major importance that are not usually covered in regular community administration or community planning courses. May be repeated to a maximum of 8 credits. Prereq: permission. Special fee. 1–4 cr.

Computer Engineering

(See Electrical and Computer Engineering.)

Computer Science (CS)

(For program description, see page 58.)

Chairperson: Philip J. Hatcher
Professors: R. Daniel Bergeron, Eugene C. Freuder, Philip J. Hatcher, T. M. Sparr
Associate Professors: Pilar de la Torre, Robert D. Russell, James L. Weiner
Adjunct Associate Professor: Sylvia Weber Russell
Assistant Professors: Radim Bartos, Elizabeth Varki
Adjunct Assistant Professors: Elise H. Turner, Roy M. Turner
Instructors: Mark L. Bochert, Charles D. Elfe, Michael Gildersleeve, Brian L. Johnson, Israel J. Yost

401. Computer Applications
Use of computers to manage and analyze information across a variety of settings and disciplines. Introduction to major categories of software for large and small computer systems and discussion of the computer's role in today's society. No prior computer experience required. Significant hands-on work in campus clusters required. Not open to students who have completed DCE 491 or 492. Not open to CS majors. CEPS students should check with their major department for approval. Special fee. 4 cr.

403. Online Network Exploration
Introductory course covering basic topics relating to the Internet. Subjects discussed include e-mail, newsgroups, mailing lists, file transfer, telnet, the World Wide Web, Web browsers, search engines, and hypertext markup language (HTML). A large portion of the course focuses on Web publishing. Security and privacy issues, and commerce and legal issues are also discussed. Students are expected to have no previous experience with HTML. They will acquire new skills as well as broad understanding of the technical possibilities of living and working in an online society and its implications. Special fee. 4 cr.

410. Introduction to Scientific Programming
Introduction to the concepts and techniques of computer programming. Particular emphasis on computer programming as a problem-solving technique in science and engineering applications. The C language is taught and used for assignments. Good programming style is stressed. Significant out-of-class programming required. Not open to students who have completed CS 411, 415, or the equivalent. Pre- or coreq: MATH 425. 4 cr.

411. Introduction to Computer Programming with Java
Introduction to the concepts and techniques of computer programming, including basic data structures such as lists, stacks, and queues. The topics include control structures, file manipulation, recursion, and an introduction to graphic user interface design. Introduces object-oriented design and analysis, including class definition and use, inheritance, and polymorphism. Good programming style is stressed. Significant out-of-class programming required. Not open to students who have had CS 410, CS 415, or the equivalent. 4 cr.

415-416. Introduction to Computer Science I and II
Theory and practice of computer science. Algorithm development and analysis; data abstraction techniques; elementary data structures; dynamic memory manipulation; debugging; and program design issues. Computer systems and applications. Intended for CS majors. 4 cr.

505. Applications Programming Using Visual Basic
Introduction to the concepts and techniques of microcomputer windows programming. Students use the Visual Basic language to devleop modular, event-driven programs/applications. Topics include forsm, properties, controls, variables, decision structures, and built-in and user-defined functions and subroutines. CEPS students should check with their major department for approval. Special fee. 4 cr.

512. Introduction to Data Structures with C++
Introduction to basic data structures including strings, stacks, queues, lists, files, and binary search trees; emphasis on abstract data type (ADT) design and programming techniques. Basic introduction to C++ including nonhierarchical classes, operator overloading, template functions, and template classes. Not open to CS majors or students who have had CS 415. Prereq: CS 410, 411, or equivalent. 4 cr.

515. Data Structures
Review of basic data structures; advanced data structures such as graphs, B-trees, and AVL trees; abstract data structure design and programming techniques; use of data abstraction language. Introduction to algorithm analysis. Prereq: CS 416. 4 cr.

610. Operating System Fundamentals
Introduction to operating system concepts and design. Job, process, and resource management; scheduling; file systems; interprocess communication. Prereq: CS 410, 411, or 416; and CS 611 or EE 612. 4 cr.

611. Assembly Language Programming and Machine Organization
Assembly language programming and machine organization: program and data representation; registers, instructions, and addressing modes; assemblers and linkers. Impact of hardware on software and software on hardware. Historical perspectives. Prereq: CS 410, 411, or 416. 4 cr.

658. Analysis of Algorithms
Introduction to use of basic mathematics in design and analysis of computer algorithms. Topics include O-notation, divide and conquer, the greedy method, dynamic programming, and NP-completeness. Prereq: MATH 531 and 532; CS 515. 4 cr.

659. Introduction to the Theory of Computation
Review of sets, relations, and languages. Induction and diagonalization. Finite automata, context-free languages, pushdown automata. Basic complexity theory. Prereq: MATH 531 and 532; CS 515. 4 cr.

671. Programming Language Concepts and Features
Programming language syntax and semantics; characteristics of imperative, applicative, and special purpose symbol manipulation languages illustrated by comparing several existing languages and writing simple programs in them, and by implementing a series of simple interpreters. Prereq: CS 416. 4 cr.

696. Independent Study
Individual projects developed and conducted under the supervision of a faculty member. Prereq: permission of faculty supervisor and department chairperson. May be repeated for credit. 1–6 cr.

712. Compiler Design
Formal languages and formal techniques for syntax analysis and parsing; organization of the compiler and its data structures; problems presented by error recovery and code generation. Classical top-down and bottom-up techniques currently in widespread use, general discussion of LL(k) and LR(k) parsers; automatic methods of compiler generation and compiler compilers. Students required to define a simple, nontrivial programming language and to design and implement its compiler. Pre- or coreq: CS 671. 4 cr.

718. Software Engineering
Design approaches, implementation methodologies, and management techniques required to develop large, reliable software systems, including applications-oriented systems. Team programming projects. Prereq: CS 515 or permission. 4 cr.

719. Object-Oriented Methodology
Object-oriented system design and programming. Languages for object-oriented programming. Prereq: CS 515 or permission. Writing intensive. 4 cr.

720. Operating System Programming
Detailed discussion of operating system concepts and features. Practical examples and exercises that utilize advanced operating system features, including interprocess communication, synchronization, client-server communication, shared memory, threads, remote procedure calls, and device-level I/O. Discussion of POSIX 1003.1 Part I Standards. Prereq: CS 610. 4 cr.

721. Operating System Kernel Design
Design and implementation of an operating system kernel, using LINUX as an example. Detailed discussion of the data structures and algorithms used in the kernel to handle interrupts, schedule processes, manage memory, access files, deal with network protocols, and perform device-level I/O. Course is project-oriented, and requires the student to make modifications and additions to the LINUX kernel. Prereq: CS 720 or permission. 4 cr.

722. Advanced Systems Programming
Topics in systems programming. Organization and implementation of typical POSIX 1003.2 utilities and tools. Emphasis on file handling, text processing, pattern matching, and portability. Prereq: CS 610. 4 cr.

725. Computer Networks
Introduction to local, metropolitan, and wide-area networks using the standard OSI reference model as a framework. Introduction to the Internet protocol suite and to network tools and programming. Discussion of various networking technologies. Prereq: CS 610. 4 cr.

727. Computer Communications Software Design
Telecommunications software; error detection algorithms; asynchronous and synchronous communications software; network architectures; protocol definition and implementation; links through a local area network; timing considerations. Selected communications software will be implemented. Prereq: CS 610. 4 cr.

730. Introduction to Artificial Intelligence
Machine intelligence, representation and control issues, search methods, problem solving, learning, natural language understanding, knowledge engineering, game playing. Heuristic programming using the LISP language. Prereq: CS 515. 4 cr.

735. Introduction to Parallel Programming
Data-parallel programming, message-passing parallel programming, parallel programming with threads, performance evaluation of parallel programs, debugging of parallel programs, and parallel hardware. Course requirements consist primarily of programming assignments. Parallel programming tools based upon the C/C++ programming languages used. Prereq: CS 610; 611 or EE 612;/or permission. Writing intensive. 4 cr.

#746. Introduction to Programming Semantics
Informal, nonmathematical introduction to descriptive techniques of denotational semantics. Provides framework needed to formally describe programming languages such as PASCAL. No previous knowledge of the theory of computation or of any particular programming language is assumed. Prereq: CS seniors only or instructor's permission. 4 cr.

753. Introduction to Numerical Methods
An introduction to mathematical algorithms and methods of approximation. A wide survey of approximation methods are examined including, but not limited to, polynomial interpolation, root finding, numerical integration, approximation of differential equations, and techniques used in conjunction with linear systems. Included in each case is a study of the accuracy and stability of a given technique, as well as its efficiency and complexity. It is assumed that the student is familiar and comfortable with programmming a high-level computer language, such as C or FORTRAN. Prereq: MATH 426; CS 410, 412 or 416. (Also offered as MATH 753.) 4 cr.

754. Introduction to Scientific Computing
Introduction of the tools and methodology of scientific computing via the examination of interdisciplinary case studies from science and engineering. Emphasis on numerical approaches to solving linear systems, eigenvalue-eigenvector problems, and differential equations. Problems are solved on various hardware platforms using a combination of software and data visualization packages. Prereq: linear algebra; differential equations; introduction to programming; /or permission. (Also offered as MATH 754, PHYS 754) 4 cr.

760. Introduction to Human-Computer Interaction
Human-computer interaction is a discipline concerned with the design, evaluation, and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them. Prereq: CS 610. Writing intensive. 4 cr.

765. Introduction to Computational Linguistics
Introduction to computational analysis of natural language with a focus on semantic representations and the resolution of ambiguity. Provides an elementary working knowledge of linguistic and artificial intelligence analysis methods as motivated by examples of potential input texts. Topics include parsing, formal grammars, representation of knowledge and memory, inference, and interpretation of nonliteral language. Prereq: elementary knowledge of LISP or instructor's permission. 4 cr.

770. Computer Graphics
Input-output and representation of pictures from hardware and software points of view; interactive techniques and their applications; three-dimensional image synthesis techniques. Prereq: CS 515. Writing intensive. 4 cr.

775. Database System Principles
Introduction to database system concepts and design; data models, especially the relational model; data description and manipulation languages; normalization and schema design; implementation issues and mechanisms. Prereq: CS 515; MATH 531. 4 cr.

780. Topics in Computer Science
Material not normally covered in regular course offerings. May be repeated for credit. 4 cr.

Decision Sciences (DS)

(For program description, see page 97.)

Chairperson: Craig H. Wood
Professors: Marvin J. Karson, Barry Shore, Jeffrey E. Sohl, Linda G. Sprague
Associate Professors: Richard L. Mills, R. Daniel Reid, A. R. Venkatachalam, Craig H. Wood

Assistant Professors: Roger B. Grinde, Christine M. Shea
Instructor: Peter W. Royce

420. Business Statistics
Introductory coverage of statistical methods for managerial decision making: probability, descriptive and inferential statistics, and regression. Quantitative techniques common to many introductory statistics courses are covered, but the emphasis is on understanding concepts such as uncertainty, inferences from sample data, and model formulation, and on utilizing these techniques as aids in decision making. No credit for students who have had ADM 430; BIOL 528; EREC 525; HHS 540; MATH 644; PSYC 402; SOC 502. 4 cr.

#522. Advanced Business Statistics
A second-level course in statistics covering such topics as sample survey design and analysis, experimental design, analysis of variance, nonparametric methods, and GLIM. Prereq: DS 420 or equivalent. 4 cr.

#624. Time Series Forecasting
Introduction to modern methods of forecasting from time series data. Exponential smoothing, time series analysis and stationarity, Box-Jenkins analysis, state space model fundamentals, dynamic regression models. Each model methodology includes model identification, estimation, and diagnostic checking. Emphasis on use of the models as forecasting tools. Prereq: DS 420 or equivalent. 4 cr.

#625. Statistical Decision Making
Introduction to decision-making theory, including alternatives, criteria, loss functions, and risks. A probabilistic, including Bayesian, approach to decision making under uncertainty. Applications from statistics and management science. Prereq: DS 420 or equivalent. 4 cr.

626. Applied Regression Analysis
Introduction to regression techniques as used in business; estimation and statistical inference in the context of the general linear model; residual analysis and model selection; interpretation of the analysis is emphasized. No credit for students who have had DS 726. Prereq: DS 420 or equivalent. 4 cr.

630. Quantitative Methods
An introduction to quantitative methods and how these methods serve as an input to the decision-making process. The topics covered include linear programming problem formulation and solution, sensitivity analysis, network models, integer programming, goal programming, and forecasting. Prereq: WSBE majors only; all Group A courses and junior standing. 4 cr.

632. Operations Research/Management Science
Review of the basic principles and methods of operations research/management science applied to managerial decision making. Mathematical programming, networks, inventory, queuing, and scheduling. Junior or senior standing. 4 cr.

633. Advanced Operations Research/Management Science
Analysis of complex operations research/management science models and their impact on the decision-making process. Project is undertaken by all students. Advanced mathematical programming (nonlinear, parametric linear, stochastic, and dynamic), stochastic inventory models, heuristic programs, and forecasting. Prereq: DS 630, 632, or equivalent. 4 cr.

650. Operations Management
Introduction to planning and analysis of operational problems in the manufacturing and service sectors; strategy standards, capacity, inventory, scheduling, and planning and control systems. Prereq: WSBE majors only; all Group A courses and junior standing. 4 cr.

670. Management Information Systems
Provides students with the background necessary to understand, develop, and use computer-based information systems in organizational environments. Topics include information technology, application software, and management of information resources. Prereq: CS 401 (or 495); WSBE majors only; all Group A courses and junior standing. 4 cr.

#672. Computer Systems Analysis and Design
Analysis and design of computer systems in administration. Applications in finance, accounting, marketing, and manufacturing. Case studies and projects. Prereq: DS 670 or equivalent. 4 cr.

#698. Topics in Decision Sciences
Special topics; may be repeated. Prereq: permission. 4 cr.

754. Resource Management
Analysis and development of resource management planning and control systems. Topics include inventory management, material requirements planning, and capacity management. Prereq: DS 650 or permission. 4 cr.

755. Manufacturing Management
Analysis and development of manufacturing management planning and control systems. Topics include production planning, master scheduling, distribution, and production activity control. Prereq: DS 650 or permission. 4 cr.

758. Strategic Management of Operations
Application of techniques and methodologies in the development of operations strategies. Projects with client firms using operations analysis emphasizing the firms' strategic operations alternatives. Prereq: DS 650 and permission. 4 cr.

765. Total Quality Management
Integration of management aspects of quality improvement with methodologies and tools for problem-solving and implementation. Experiential team projects and hands-on in-class exercises are used to supplement and enhance extensive written and video cases, facility tours, and guest speakers. (Also offered as MGT 765.) Prereq: DS 650 and MTG 611 or permission. 4 cr.

#767. Art and Science of Decision Making
Builds from the classical theory of decision making and explores the problems inherent in the decision process. Both individual and group or two-party decision processes are explored with emphasis on negotiation as a means of decision making. No prerequisite required. 4 cr.

772. Decision-Support Systems
Exploration of computer usage in support of the problem-solving and decision-making process. Topics include conceptual foundations of decision-support systems, design of decision-support systems, spreadsheets, databases, and expert systems. Use of microcomputers, cases, projects. Prereq: all Group B courses; DS 670; or permission. 4 cr.

798. Topics in Decision Sciences
Special topics; may be repeated. Prereq: permission. 4 cr.

Division of Continuing Education (DCE) Career Concentration Courses

(For program description, see page 114.)

Dean of the Division of Continuing Education: William F. Murphy

519. Career Planning
Skills and methods of career planning, including integration of career and educational goals. Topics include self-assessment, occupational investigation, occupational selection and decision making, goal setting, and job search techniques. Available to associate degree students, freshmen, and sophomores; others by permission. Special fee. 2 cr.

#599. Special Topics
Occasional course offerings of specialized material in A.A. career concentrations; general studies topics for nontraditional learners; travel/study programs. Prereq: permission. 1–4 cr.

Computer/Information Systems Applications

491. Computer/Information Systems Applications I
Computer hardware and software topics, focusing on applications and the usage of computers to solve a variety of problems. Major categories of software on microcomputers are utilized for demonstrations, discussions, and assignments. No computer experience required. Not open to students who have completed CS 401. Not open to WSBE majors. 2 cr.

492. Computer/Information Systems Applications II
Information system concepts, such as information development, processing, communications, automation, and ergonomics usage examined. Focus of assignments will be using various application software programs from the introductory course, DCE 491, and additional software to solve problems and develop concepts. Prereq: DCE 491. Not open to students who have completed CS 401. Not open to WSBE majors. 2 cr.

590. Advanced Applications in Computer Systems
Emphasizes advanced usage and comparison of application software on microcomputers. Topics include: advanced word processing and spreadsheet development, including macros and their usage; graphics, design and desktop publishing; networking; management and decision making software; file types, management, transfer, and integration; software development; multimedia concepts and usage; and more. Prereq: DCE 492 or CS 401; CS 403. Special fee. Not open to WSBE majors. 4 cr.

591. Systems Interface and Design
Examination, evaluation, design, and implementation of computer interfaces and integrated systems in the working environment. Views, costs and design processes will be discussed and developed. Design of interfaces and establishment of systems in different environments will be explored, including topics in human factors analysis, user expectations, communication facilities, report writing and implementation, and more. Prereq: DCE 492 or CS 401; CS 403 and/or DCE 590. 4 cr.

592. Database Applications
Students use database software in a microcomputer setting to understand concepts and develop programs in information systems. Subsequent to a basic introduction and exploration of database usage and concepts, detailed database examination, comparison, and programming are used to solve various problems and complete projects. Prereq: DCE 492 or CS 401; CS 403; DCE 590 recommended. 4 cr.

595. Independent Study in Information Systems Applications
Students adequately prepared by coursework and/or experience pursue an in-depth project under the direction and supervision of the coordinator. Prereq: permission prior to registration. 1–4 cr.

596. Technical Writing
Students learn to produce both technical and nontechnical documents for applications in education, business, industry, and the home. Each student creates small manuals for critique by the instructor and the class. Topics include logical thinking and organization, interviewing skills, technical writing styles and formats, word processing/graphic programs, paste-up, color usage, cover selection/design, interfacing with a print shop, and budget analysis. Prereq: ENGL 401 or 501; CS 401 or DCE 491-92. 4 cr.

597. Documentation Practicum
This independent work project stresses techniques and mechanics required to produce a highly useful, professional document. Under the direction of a coordinator, students apply knowledge previously acquired through courses in this program to create a substantial, final product. Prereq: DCE 596 or permission. 2 cr.

Criminal Justice

552. Corrections Treatment and Custody
Scientific diagnosis and treatment of offenders. Institutional administration methods' climate, personnel, structure, and procedure. 4 cr. (Not offered every semester.)

554. Juvenile Delinquency
Overview of criminological research and theory regarding patterns and sources of juvenile delinquency. Examines the history and structure of the American juvenile justice system. 4 cr. (Not offered every semester.)

Merchandising

411. Promotion and Advertising
Mass communication in marketing; use of advertising media; integration of promotional plans and sales techniques; evaluation of promotional efforts. Not open to WSBE majors. 4 cr.

531. Salesmanship
Principles and techniques of personal selling; customer's needs and satisfaction. Not open to WSBE majors. 4 cr.

Earth, Oceans, and Space, Institute for the Study of (EOS)

(For program description, see page 100.)

Director of Graduate Studies: Berrien Moore, III
Professors: John D. Aber, Roger L. Arnoldy, Wendell S. Brown, Ann C. Bucklin, Edward L. Chupp, Henri E. Gaudette, Joseph Hollweg, Martin A. Lee, Theodore C. Loder III, Paul A. Mayewski, Loren D. Meeker, Eberhard Möbius, Berrien Moore III, Barrett N. Rock, James M. Ryan, Roy B. Torbert, Karen L. Von Damm
Research Professors: Terry Forbes, Changsheng Li, Robert W. Talbot, W. T. Vestrand
Research Associate Professors: Janet W. Campbell, Patrick M. Crill, Jack E. Dibb, David J. Forrest, Antoinette B. Galvin, Philip A. Isenberg, Lynn M. Kistler, Mark L. McConnell, Michael L. Prentice, Dork L. Sahagian, Charles J. Vorosmarty, Gregory A. Zielinski
Research Assistant Professors: Glenn M. Berntson, Stephen E. Frolking, George C. Hurtt, Cameron P. Wake, Xiangming Xiao

405. Global Environmental Change
Human activity rivals nature as an agent of change in the global environment. Explores evidence of environmental degradation in the Earth's crust, hydrosphere, and atmosphere; considers the prospects for future sustainable human health, diversity, and economic development. Problem solving through critical analysis of environmental variables. (Also offered as ESCI 405.) 4 cr.

#707. Global Ecosystem Policy
Scientific and institutional issues pertinent to global change; long-term effects of major human perturbations (greenhouse warming of the atmosphere, ozone depletion, deforestation, desertification, and biotic and soil impoverishment) and human-environment feedback mechanisms on the viability of ecosystems; effectiveness of existing and alternative national, regional, and international institutions in responding to global change. Prereq: permission. 3 cr.

712. Physics of the Ionosphere
Introduces basic plasma physics using a case study of the Earth's ionosphere and its connection both to the upper atmosphere and to the Earth's magnetosphere. Topics include single particle motion, fluid and kinetic descriptions of ionospheric plasma, wave propagation, and instabilities. Prereq: electric. and magnet. I or equivalent; calculus II. (Also offered as PHYS 712.) 4 cr.

713. Biogeochemical Dynamics
Examines the influence of biological processes on geochemical transformations and elemental cycles from the molecular to the global scale involving both microorganisms and higher plants and animals; factors that regulate cycles; interactions among biosphere, hydrosphere, lithosphere, and atmosphere; transformations of C, N, S, and trace elements. Prereq: one semester each biology and chemistry. 3 cr.

715. Global Atmospheric Chemistry
Introduction to the principles of atmospheric chemistry and their relationship to biogeochemical cycles, climate, and global change. Focus is on understanding the basic physical and chemical processes that determine the trace gas distribution in the global troposphere. An introduction to atmospheric vertical structure and global circulation dynamics provides the foundation. Then chemical cycles of important C, S, and N molecules examined, including their possible perturbation by human activities. Basic photochemical processes outlined, particularly with respect to reactive nitrogen, hydrocarbons, and the production/destruction of ozone. Prereq: one year chemistry. (Also offered as ESCI 715.) 3 cr.

717. Macro-scale Hydrology I
Focus on the numerous roles of water in the Earth system. Topics include the global water cycle, impacts of the greenhouse effect and other anthropogenic disturbances, hydrologic modeling, soil-vegetation-atmosphere transfer schemes, water quality, GIS and water-related remote sensing tools. Based on extensive reading of current scientific literature, students and instructor jointly select a research topic in macro-scale hydrology which results in the preparation of a manuscript for publication in a refereed scientific journal. Designed to be taken two consecutive semesters (fall and spring). Prereq: ESCI 705 or permission. 4 cr.

718. Macro-scale Hydrology II
A continuation of EOS 717. Students and instructor jointly select a research topic in macro-scale hydrology to be analyzed in depth during the course of the semester. A primary goal is the preparation of a manuscript for publication in a refereed scientific journal. Extensive library research, reading of recent and relevant scientific literature, technical analysis, writing. Prereq: EOS 717. Writing intensive. 4 cr. (Offered every other year.)

731. A Systems Approach to Biological Ocean Science
Broad survey of biological ocean science for advanced undergraduate and graduate students. Uses an interdisciplinary, "systems" approach to focus on major opportunities and challenges for ocean science in the future. Classes meet for one three-hour session each week and include lecture, discussion, demonstration, and laboratory sessions appropriate to the subject material with presentations by guest speakers. Focus of the course is different each time it is offered; topics have included temporal and spatial scales of variation, estuarine ecosystem dynamics. May be repeated. Prereq: permission. (Also offered as ZOOL 731.) 3 cr.

#754. Ocean Waves and Tides
Introduction to waves: small amplitude, linear wave theory, standing and propagating waves, transformation in shallow water, energy and forces on structures, generation by wind and specification of a random sea, long waves with rotation, and internal waves. Introduction to tides: description of tides in ocean tidal generation forces, equilibrium tide, and tidal analysis. Lab/project: field and lab measurements with computer analysis. Prereq: PHYS 407-408; MATH 527;/or permission. (Also offered as OE 754.) Lab. 4 cr.

764. Introductory Paleoclimate Analysis
An overview of paleoclimate indicators for the last one million years in the context of global teleconnections (atmosphere-lithosphere-hydro-

sphere-cryosphere) and mathematical tools developed to interpret and link the different records of climate change. Prereq: one year calculus, one year chemistry, basic statistics;/or permission. (Also offered as ESCI 764.) 4 cr.

765. Natural Climate Variability
Review of paleoclimate over the last several billion years of Earth history with particular emphasis on paleoclimate indicators and major events. 4 cr.

795. Topics in Earth, Oceans, and Space
Study on an individual or group basis of topics not covered by the other listed courses. Topics may include any area relevant to interest in Earth, ocean, atmospheric, and space studies. May be repeated. Lab. 1–4 cr.

Earth Sciences (ESCI)

(For program description, see page 59.)

Chairperson: Wallace A. Bothner
Professors: Franz E. Anderson, Francis S. Birch, Wallace A. Bothner, Wendell S. Brown, S. Lawrence Dingman, Henri E. Gaudette, Theodore C. Loder III, Paul A. Mayewski, Karen L. Von Damm
Research Professor: Robert W. Talbot
Adjunct Professors: Eugene L. Boudette, Anthony Jack Gow
Associate Professor: Jo Laird
Research Associate Professors: Janet W. Campbell, Patrick M. Crill, Jack E. Dibb, Michael L. Prentice, Dork L. Sahagian, Charles J. Vorosmarty, Larry G. Ward, Gregory A. Zielinski
Adjunct Associate Professor: Neal R. Pettigrew
Assistant Professors: William C. Clyde, John Matthew Davis
Research Assistant Professors: Stephen E. Frolking, Cameron P. Wake
Adjunct Assistant Professors: Frank L. Bub, Barry D. Keim

401. Principles of Geology I
The earth; earth materials (rocks and minerals), landforms, and the processes that form them (volcanism, earthquakes, glaciation, etc.). Field trips. Special fee. Lab. 4 cr.

402. Earth History
Introduction to basic geological principles. Use of case studies to illustrate scientific methods used in reconstructing Earth's evolution through time. Topics include the origin of the Earth, the Cambrian explosion of life, building of the Appalachians, assembly of Pangaea, the rise and fall of dinosaurs, the formation of the Rocky Mountains, mammalian evolution, Pleistocene glaciation, and human origins. Special fee. Lab. 4 cr.

405. Global Environmental Change
Human activity rivals nature as an agent of change in the global environment. Explores evidence of environmental degradation in Earth's crust, hydrosphere, and atmosphere; considers prospects for future sustainable human health, diversity, and economic development. Problem solving through critical analysis of environmental variables. (Also offered as EOS 405.) Special fee. Lab. 4 cr.

409. Environmental Geology
Environmental impact of geologic processes; natural hazards—landslides, earthquakes, volcanoes, flooding, erosion, and sedimentation; land exploitation and site investigations; environmental considerations of water-supply problems; the recovery of energy and mineral resources. Special fee. Lab. Students may not receive credit for both ESCI 401 and ESCI 409. 4 cr.

#450. Introduction to the Earth Sciences
Modular course introducing contemporary topics in earth sciences. Successful completion of four modules fulfills one gen ed Group 3 (physical science) requirement. Each module is approximately 3.5 weeks. Four of the following topics are offered each semester (check Time and Room Schedule for current semester offerings): Planetary Geology; Plate Tectonics; Rocks and Minerals; Earthquakes; Water Resources of New England; Springs and Underground Rivers; Evolution of Mountains; Volcanoes; The Global Ocean; The Gulf Stream; Geologic Time; Climate Change; Beaches and Coasts; Prehistoric Life; Energy and the Environment; Geology of Puerto Rico. Additional topics may be available. Special fee. Lab. 1 cr.

501. Introduction to Oceanography
Physical, chemical, geological, and biological processes in the sea. Special fee. Lab. 4 cr.

512. Principles of Mineralogy
Natural history of the solid state; introductory crystallography, diffraction, and structure of minerals. Silicate minerals; their chemical and physical properties, origins, occurrences, and uses. Nonsilicates. Prereq: CHEM 401, 403, or 405. Field trips. Special fee. Lab. 4 cr.

530. Field Methods
Standard geological field-mapping techniques, including pace and compass and plane table and alidade; bedrock and surficial mapping on topographic and aerial photographic bases in local areas; one 3- to 4-day exercise in a selected area of the northern Appalachian Mountains. Prereq: ESCI 401 or 409; 402. Special fee. Writing intensive. 4 cr.

561. Surficial Processes
Processes leading to the development of landforms, chemical and mechanical weathering of earth-surface materials and erosion and transport in colluvial, fluvial, glacial, and coastal systems. Field trips. Prereq: ESCI 401 or permission. Special fee. Lab. 4 cr.

#595, 596. Introductory Investigations in Earth Sciences
Special topics by means of lectures, conferences, assigned readings, and/or field or laboratory work in the areas of geology, hydrology, or oceanography. 1–4 cr.

614. Optical Mineralogy and Petrography
Description and classification of igneous, sedimentary, and metamorphic rocks in hand specimen and thin section; optical mineralogy. Prereq: ESCI 512. Special fee. Lab. 4 cr.

631. Structural Geology
Structural units of the Earth's crust and mechanics of their formation. Prereq: ESCI 530. Special fee. Lab and fieldwork. 4 cr.

652. Paleontology
Use of the fossil record to address current problems in Earth history, paleoecology, and evolutionary biology. Examples are drawn from both vertebrates and invertebrates. Lab combines analytical paleontological methods with a systematic survey of important fossil groups. Prereq: ESCI 402 or permission. Special fee. Lab. 4 cr.

653. Estuaries and Coasts
Examines physical and biological aspects of estuaries and coasts with special regard to sediment transport. Includes field trips and cruises to the coastal environments of New Hampshire and Maine, with follow-up laboratory analyses. A student project is required involving field sampling and oceanographic equipment design, fabrication, and testing. Prereq: ESCI 501;/or permission. Special fee. Lab. 4 cr.

658. Principles of Earth, Ocean, and Atmospheric Dynamics
Introduction to the basic elements of kinematics and dynamics, relevant to processes important in earth, ocean, and atmospheric sciences. Review of particle dynamics followed by an introduction to continuum mechanics of the solid earth, hydrologic, and environmental fluid systems. Includes biweekly laboratories and homework problem recitation sessions. Prereq: MATH 426, PHYS 407. Lab. 4 cr.

703. Fluvial Hydrology
Mechanics of natural open-channel flows: forces, the continuity and energy principles, velocity distributions, flow resistance, fluvial erosion and sediment transport, channel form, computation of flow profiles, weirs, hydraulic jumps, and stream-flow routing. Lab and field exercises. Prereq: one year each of calculus and physics. Special fee. 4 cr.

705. Principles of Hydrology
Basic physical principles important in the land phase of the hydrologic cycle, including precipitation, snowmelt, infiltration and soil physics, evapotransportation, and surface and subsurface flow to streams. Problems of measurement and aspects of statistical treatment of hydrologic data. Field trips. Prereq: MATH 425 (or MATH 424) and PHYS 402. Special fee. Lab. 4 cr.

#708. Hydrology and Water Resources
Interrelations of hydrologic data and analysis with the environmental, economic, and legal aspects of water resource management. Examination of local, national, and global water-resource problems. Prereq: ESCI 705; basic statistics;/or permission. 3 cr.

710. Groundwater Hydrology
Principles for fluid flow in porous media with emphasis on occurrence, location, and development of groundwater but with consideration of groundwater as a transporting medium. Major topics include well hydraulics, regional groundwater flow, exploration techniques, and chemical quality. Laboratory exercises involve use of fluid, electrical, and digital computer models to illustrate key concepts. Prereq: ESCI 705 or permission. Special fee. Lab. 4 cr.

715. Global Atmospheric Chemistry
Introduction to the principles of atmospheric chemistry and their relationship to biogeochemical cycles, climate, and global change. Focus is on understanding the basic physical and chemical processes that determine the trace gas distribution in the global troposphere. An introduction to atmospheric vertical structure and global circulation dynamics provides the foundation. Then chemical cycles of important C, S, and N molecules exam-

ined, including their possible perturbation by human activities. Basic photochemical processes outlined, particularly with respect to reactive nitrogen, hydrocarbons, and the production/destruction of ozone. Prereq: one year chemistry. (Also offered as EOS 715.) 3 cr.

717. Macro-scale Hydrology I
Focus on the numerous roles of water in the Earth System. Topics include: the global water cycle, impacts of the greenhouse effect and other anthropogenic disturbances, hydrologic modeling, soil-vegetation-atmosphere transfer schemes, water quality, GIS and water-related remote sensing tools, global freshwater resources. Course is organized around formal lectures, in-class discussion, student presentations, class projects. Prereq: ESCI 705 or permission. 4 cr. (Offered alternate years.)

718. Macro-scale Hydrology II
A continuation of ESCI 717. Students and instructor jointly select a research topic in macro-scale hydrology to be analyzed in-depth during the course of the semester. A primary goal is the preparation of a manuscript for publication in a refereed scientific journal. Extensive library research, reading of recent and relevant scientific literature, technical analysis, and writing. Prereq: ESCI 717. 4 cr. (Offered alternate years.)

725. Igneous Petrology
The evolution of igneous rocks as determined from field, petrographic, chemical, experimental, and theoretical studies. Application of thermodynamics to igneous petrogenesis. Physical properties of magmas. Prereq: mineralogy; petrography; adequate background in calculus, chemistry, and physics. Field trips. Special fee. Lab. 4 cr. (Offered alternate years with ESCI 726.)

726. Metamorphic Petrology
The metamorphism of pelitic, mafic, and calc silicate rocks as determined from field, petrographic, mineral chemistry, experimental, and theoretical studies. Closed- and open-system reactions, multisystems, reaction space. Calculation of pressure-temperature time paths. Prereq: mineralogy; petrography; adequate background in calculus, chemistry, and physics. Field trips. Special fee. Lab. Writing intensive. 4 cr. (Offered alternate years with ESCI 725.)

732. Regional Geology and Advanced Structure
Readings, discussion, and field/lab exercises in the tectonic analysis of mountain systems. Emphasis on the northern Appalachian Orogen. Application of modern structural analysis. Field excursion. Prereq: ESCI 631 or permission. Special fee. 4 cr.

734. Applied Geophysics
Gravity, magnetic, seismic, and electrical methods of investigating subsurface geology. Fieldwork and use of computers in data analysis. Prereq: ESCI 401; one year of calculus; one year of college physics;/or permission. Special fee. Lab. Writing intensive. 4 cr.

741. Geochemistry
Thermodynamics applied to geological processes; geochemical differentiation of the earth; the principles and processes that control the distribution and migration of elements in geological environments; stable and radiogenic isotopes in geologic processes. Prereq: ESCI 512 or permission. 4 cr.

745. Isotope Geochemistry
Discussion of element abundance and isotope formation; radioactive decay as applied to geologic systems, detailed investigation of K-Ar, Rb-Sr, U-Pb, and Sm-Nd systems, and geologic-oceanographic applications of stable isotopes. Lab involves mass spectrometic and chemical techniques of isotopic analysis. Course includes the completion of a laboratory project. Prereq: ESCI 741;/or permission. Special fee. Lab. 4 cr.

746. Analytical Geochemistry
Theory, instrumentation, and applications of analytical methods in geochemistry. Prereq: one year of chemistry or geochemistry;/or permission. Special fee. Lab. 4 cr.

747. Aqueous Geochemistry
Processes that determine the geochemical characteristics of water bodies. Emphasis on the geochemical continuum of terrestrial water and its geochemical evolution. Topics include the influence of cyclic salts, the nature of weathering reactions, the CO_2-$CaCO_3$ system, the formation and dissolution of salts and authigenic mineral formation. Prereq: one year of chemistry or geochemistry;/or permission. Lab. 4 cr.

#750. Biological Oceanography
Biological processes of the oceans, including primary and secondary production, trophodynamics, plankton diversity, zooplankton feeding ecology, microbial ecology, and global ocean dynamics. Emphasis on experimental approaches. Term project involves either development of an ecosystem model or performance of a field experiment. Field trips on R/V Gulf Challenger and to the Jackson Estuarine Laboratory. Prereq: one year of biology or permission of the instructor. (Also offered as ZOOL 750.) 4 cr.

752. Chemical Oceanography
Water structure, chemical composition and equilibrium models, gas exchange, biological effects on chemistry, trace metals, and analytical methods. Lab includes short cruise aboard R/V Gulf Challenger. Prereq: permission. Lab (optional) with special fee. 3 or 4 cr.

#754. Sedimentary Rocks and Stratigraphy
Examine observational and interpretative techniques to evaluate sedimentary rocks in their stratigraphic context. The relationship between time, space, and deposition is assessed using a problem-solving approach based on real geological examples. Topics such as facies analysis, stratigraphic correlation, and basin analysis provide the framework to interpret the stratigraphic record of earth history. Prereq: ESci 614 or permission. Special fee. Lab and field trip. 4 cr.

755. Analytical Techniques for Sediments
A laboratory course focusing on applied analytical techniques geoscientists use in sediment sampling; coarse- and fine-grained textural analysis, and some aspects of mineralogical composition. Special fee. Lab. 2–4 cr.

#756. Estuarine Sedimentation
Examines all aspects of estuarine sedimentation, from erosion and transportation to deposition. Emphasis on fine-grained estuarine sediments and factors affecting particulate matter transport. Animal/sediment and plant/sediment interactions considered in detail. Includes an in-depth field research project in student's area of interest conducted by graduate students with undergraduate participation at the Jackson Estuarine Laboratory. Subject matter is relevant to students in related disciplines in which animal/plant/sediment relationships are important. Lab. 4 cr.

758. Introductory Physical Oceanography
Descriptive treatment of atmosphere-ocean interaction; general wind-driven and thermo-haline ocean circulation; waves and tides; continental shelf and nearshore processes; instrumentation and methods used in ocean research. Simplified conceptual models demonstrate the important principles. Prereq: college physics; ESCI 501;/or permission. 3 cr.

759. Geological Oceanography
Major geological features and processes of the ocean floor; geological and geophysical methods; plate tectonics. Prereq: two semesters each of calculus, physics, and geology;/or permission. Lab. Writing intensive. 4 cr.

760. Introductory Dynamic Oceanography
Basic physical laws governing ocean and atmospheric circulation under the influence of Earth rotation, density stratification, and friction. Topics include surface waves, wind-driven and thermohaline ocean circulation, ocean/atmosphere interaction, instabilities, fronts, and climate. Simplified mathematical models demonstrate the important principles. Prereq: college physics and differential equations;/or permission. 3 cr.

762. Glacial Geology
Glacial environment: glacier dynamics and glacial erosion and deposition. Review of world glacial stratigraphy in light of causes of glaciation and climatic change. Field trips. Prereq: ESCI 561 or permission. Special fee. Lab. 4 cr.

#763. Glacier Research
Glaciers as proxy indicators of climatic change with specific emphasis on the interpretation of physical and chemical time series collected from glaciers. Field and laboratory work used as a tool in the course. Prereq: surficial processes; glacial geology; one year of college calculus; one semester each of college physics and chemistry;/or permission. 4 cr.

764. Introductory Paleoclimate Analysis
An overview of paleoclimate indicators for the last one million years in the context of global teleconnections (atmosphere-lithosphere-hydrosphere-cryosphere) and mathematical tools developed to interpret and link the different records of climate change. Prereq: one year calculus, one year chemistry, basic statistics;/or permission. (Also offered as EOS 764.) 4 cr.

765. Natural Climate Variability
Review of paleoclimate over the last several billion years of Earth history with particular emphasis on paleoclimate indicators and major events. Prereq: permission. Lab. 4 cr. (Offered alternate years)

795, 796. Topics in Earth Sciences
Geologic, hydrologic, and oceanographic problems and independent studies by means of conferences, assigned readings, and field or laboratory work fitted by ESCI faculty to individual student needs; or, new or specialized courses. Topics include geochemistry; geomorphology; geophysics; glaciology; groundwater, structural, and regional geology; crystallography; mineralogy; petrology; thermodynamics; ore deposits; earth resource policy; paleontology; sedimentation; stratigraphy; water

resources management; chemical, physical, and geographical oceanography; earth systems. Also, senior synthesis and earth science teaching methods. 1–4 cr.

#799. Senior Thesis
Students work under the direction of a faculty sponsor to plan and carry out independent research resulting in an oral presentation and a written thesis. Two-semester sequence; IA (continuing course) grade given at end of first semester. May be repeated to maximum of 4 credits. 1–4 cr. IA

Economics (ECON)

(For program description, see page 97.)

Chairperson: Torsten Schmidt
Professors: Richard W. England, Evangelos O. Simos, James R. Wible
Associate Professors: Karen Smith Conway, Bruce T. Elmslie, Michael D. Goldberg, Marc W. Herold, Richard L. Mills, Neil B. Niman, Torsten Schmidt, Allen R. Thompson
Assistant Professors: Ju-Chin Huang

401. Principles of Economics (Macro)
Basic functions of the United States economy viewed as a whole: policies designed to affect its performance. Economic scarcity, supply and demand, the causes of unemployment and inflation, the nature of money and monetary policy, the impact of government taxation and spending, the federal debt, and international money matters. No credit for students who have had ECN 411. 4 cr.

402. Principles of Economics (Micro)
Functions of the component units of the economy and their interrelations. Units of analysis are the individual consumer, the firm, and the industry. Theory of consumer demand and elasticity, supply and costs of production, theory of the firm under conditions of perfect and imperfect competition, demand for and allocation of economic resources, general equilibrium, and basic principles and institutions of international trade. Not open to students who have had EREC 411. No credit for students who have had ECN 412. ECON 402H is writing intensive. 4 cr.

515. Economic History of the United States
United States economy from colonial times to the present. Models of economic development applied to the United States. How social, political, technological, and cultural factors shape economy; development and influence of economic institutions. Prereq: ECON 401 or 402;/or permission. 4 cr.

518. European Economic History
Western European economies from medieval times to the present. Explanations for differential growth rates and patterns; comparisons among political, social, and economic events. Prereq: ECON 401 or 402;/or permission. 4 cr.

#602. Introduction to Political Economy
Theoretical and historical analyses of the economic, political, and social dimensions of capitalism. Specific topics such as racism, monopoly, militarism, technological change, pollution, and business cycles. Prereq: ECON 401; ECON 402;/or permission. 4 cr.

605. Intermediate Microeconomic Analysis
Analysis of supply and demand. Determination of prices, production, and the distribution of income in noncompetitive situations and in the purely competitive model. General equilibrium. Prereq: ECON 402. 4 cr.

607. Ecological Economics
Analysis of efficiency, equity, and growth issues in the economy and their links to environmental quality and natural resources availability. Case studies of global warming, world hunger, etc. Prereq: ECON 401 and 402. 4 cr.

611. Intermediate Macroeconomic Analysis
Macroeconomic measurement, theory, and public policy determination. Prereq: ECON 401 and 402. 4 cr.

615. History of Economic Thought
Examination and critical appraisal of the work of major economists, including the work of contemporary economists, and major schools of economists, particularly with reference to the applicability of their theories to current economic problems. Prereq: ECON 401 and 402. Writing intensive. 4 cr.

#630. Comparative Study of Economic Systems
Analyzes crisis of ideologies, markets, and nonmarket systems. Swedish capitalism, reform processes of state socialist systems (Russia, Poland, Hungary), and the centrally planned Cuban economy. Stresses theory, policy, and institutions. Prereq: ECON 401 or permission. 4 cr.

635. Money and Banking
Study of interest rates, financial markets, financial institutions, monetary institutions, the supply of money, the demand for money, monetary theory, and monetary policy. Prereq: ECON 401 and 402. 4 cr.

641. Public Economics
Alternative prescriptions and explanations concerning the role of government in contemporary market economies. General principles of public expenditure analysis. Selected case studies of public spending programs, e.g., welfare, defense, education. Analysis of various federal, state, and local taxes. Prereq: ECON 401; ECON 605;/or permission. 4 cr.

642. Health Economics
Theoretical and empirical analysis of the U.S. health care delivery sector. Topics include health insurance markets and their effects on patient demand, uninsured populations and their access to health care services, breakdowns in the principal/agent relationship between patients and providers, competition in the medical sector, technology, pharmaceuticals and the scope and effect of government involvement in the delivery of health care. Prereq: ECON 402. 4 cr.

645. International Economics
Covers both international trade theory and open-economy macroeconomics. Major issues include whether free trade is always preferred to restricted trade, the controversy over industrial policy, and how best to structure the international financial system. Students gain an understanding of topics including currency exchange rate movements, macroeconomic adjustment mechanisms and trade policy, among others. Prereq: ECON 401 and 402. 4 cr.

651. Government Regulation of Business
Mergers, competition, monopoly, and the regulated industries. 4 cr.

656. Labor Economics
Functioning of labor markets from theoretical and policy perspectives. Labor demand and supply, wages and employment. Welfare programs, human capital, discrimination in the labor market, unions, wage differentials. Prereq: ECON 401; ECON 402; ECON 605 recommended. 4 cr.

668. Economic Development
Theories of development/underdevelopment. Trade, growth, and self-reliance. The role of agriculture (land tenure, food crisis, Green Revolution). World Bank policy. Industrialization strategies. Role of the state. Prereq: ECON 401; ECON 402;/or permission. Writing intensive. 4 cr.

669. Women and Economic Development
Examines the position, roles, and contribution of women in economic development as interpreted through different discourses (feminism, modernity, post modernity) and in theoretical conceptualizations (neoclassical integrationists, liberal feminism, class and gender, feminist ecology). Applied analyses on Africa, South Asia, and Latin America. Prereq: permission. Writing intensive. 4 cr.

670. Economics of Energy
The availability and use of inanimate energy resources and their relation to economic activity. Investigates energy demand, energy supply, the relation of energy to economic growth, and energy policy. Prereq: ECON 605 or permission. 4 cr.

685-686. Study Abroad
Open to students studying abroad in the discipline as approved by the economics program director. 1–16 cr. Cr/F.

#692. International Economic Integration
Systematic analysis of the process and consequences of international integration. Introduction to the theoretical foundations of free trade areas, customs unions, common markets, and economic unions. Comprehensive examination of the historical developments in the formation of major economic blocs, such as the European Union (EU) and the North American Free Trade Area (NAFTA), and evaluation of the growing political and economic relationships between member countries regarding monetary and fiscal integration. Prereq: ECON 401; ECON 402. 4 cr.

695. Independent Study
Individual research projects that are student designed. Initial sponsorship of an economics faculty member must be obtained, and approval of WSBE adviser and dean. For juniors and seniors in high standing. Up to 4 credits may be used as a major elective. Variable (in multiples of 2). 2–12 cr.

696. Supervised Student Teaching Experience
Participants are expected to perform such functions as leading discussion groups, assisting faculty in undergraduate courses that they have successfully completed, or working as peer advisers in the advising center. Enrollment limited to juniors and

seniors who have above-average G.P.A.s. Reflective final paper is required. Prereq: permission of instructor, department chair, and director of undergraduate programs. 1–8 cr. No more than 4 cr. may be earned as a teaching assistant in any one course. Cr/F.

698. Topics in Economics
Special topics. May be repeated. Prereq: permission. Writing intensive. 4 cr.

#707. Economic Growth and Environmental Quality
Analysis of the interrelationships among economic growth, technological change, population increase, natural resource use, and environmental quality. Application of alternative theoretical approaches drawn from the social and natural sciences. Focus on specific environmental problems, e.g., affluence and waste disposal problems, and loss of biodiversity. Prereq: ECON 605; 611;/or permission. 4 cr.

711. Economic Fluctuations
Recurrent movements of prosperity and depression; emphasis on causes and public policy implications. Prereq: ECON 611 or permission. Writing intensive. 4 cr.

720. U.S. Economic History
From colonial times to the present. Applied economic theory; economic models and interpretation of data. Influence of technology, industrialization, foreign trade, monetary factors, and government; noneconomic factors. Prereq: ECON 605; ECON 611;/or permission. 4 cr.

725. Mathematical Economics
Principal mathematical techniques and their application in economics. Topics covered: matrix algebra, derivatives, unconstrained and constrained optimization, linear and nonlinear programming, game theory, elements of integral calculus. Prereq: permission. 4 cr.

726. Introduction to Econometrics
Introduction to regression techniques as used in economics and management; estimation and statistical inference in the context of the general linear model; discussion of problems encountered and their solutions; extensions of the general linear model. Prereq: DS 420 or equivalent. 4 cr.

#735. Economics of Financial Markets
Economic analysis of financial market systems. Topics include financial market functions, theories of saving and investment, financial intermediation, flow-of-funds analysis, loanable funds theory, interest rate forecasting, portfolio theory, capital-asset pricing models, structure of interest rates (including term-structure theory), and macroeconomic models of the financial sector. Prereq: ECON 635. 4 cr.

736. Seminar in Monetary Theory and Policy
Contemporary developments in monetary theory and the evaluation of policy measures. Prereq: ECON 635. Writing intensive. 4 cr.

#741. Introduction to Public Policy
Explores the basic issues of public sector economics and emphasizes the use of economic theory in predicting the effects of public policy on individual behavior and the overall economy. Specific topics include market failures, collective decision making, cost/benefit analysis, and an evaluation of tax and transfer programs. 4 cr.

745. International Trade
Contemporary issues in international economic theory and policy. Analysis of trade theory, dynamics of world trade and exchange, and international commercial policy. Prereq: ECON 605; ECON 645. 4 cr.

#746. International Finance
International monetary mechanism; balance of payments, international investment; exchange rates, adjustment systems, international liquidity, foreign aid, multinational corporations. Prereq: ECON 611; ECON 645. 4 cr.

#747. Multinational Enterprises
Internationalization of economies. Growth and implications of multinational corporations at the level of systems. Theories of imperialism, international unity/rivalry; theories of direct investment, exercise of influence and conflict, technology transfer, bargaining with host country; effects on U.S. economy. Prereq: permission. 4 cr.

#755. Collective Bargaining
Historical development of the U.S. labor movement and the industrial relations system. Contemporary collective bargaining issues; the role of public policy in industrial relations. 4 cr.

#756. Labor Economics
Recent developments in labor market analysis and public policies related to contemporary labor issues. Labor supply, the structure and stratification of labor markets, economic discrimination, unemployment and poverty, inflation, and wage-price controls. Prereq: ECON 656. 4 cr.

#768. Seminar in Economic Development
Advanced reading seminar. Topics include methodologies underlying economic development theory; industrialization and post-import substitution; state capitalist development; stabilization policies; appropriate technologies; the capital goods sector; agricultural modernization schemes; and attempts at transition to socialism. Prereq: permission. 4 cr.

795. Internship
On-the-job skill development through fieldwork in an organization (business, industry, health, public service, etc.). Normally, supervision is provided by a qualified individual in the organization, with frequent consultation by a faculty sponsor. Written report required. Internships may be part or full time, with course credits assigned accordingly. May not be used as a major elective. 1–16 cr. Cr/F.

798. Economic Problems
Special topics; may be repeated. Prereq: permission of adviser and instructor. 2 or 4 cr.

799. Honors Thesis
Supervised research leading to the completion of an honors thesis; required for graduation from the honors program in economics. Prereq: permission of director of undergraduate programs and department chair. 4–8 cr.

Education (EDUC)

(For program description, see page 34.)

Chairperson: Grant L. Cioffi
Professors: Michael D. Andrew, Angelo V. Boy, Ann L. Diller, Susan D. Franzosa, Jane A. Hansen, David J. Hebert, Barbara E. Houston, Bruce L. Mallory, Sharon N. Oja
Associate Professors: John J. Carney, Grant L. Cioffi, Ellen P. Corcoran, Todd A. DeMitchell, Janet Elizabeth Falvey, Virginia E. Garland, Georgia M. Kerns, Barbara H. Krysiak, Ann L. Loranger, Rebecca S. New, Jane A. Nisbet, Joseph J. Onosko, Judith A. Robb, Paula M. Salvio, Thomas H. Schram, William L. Wansart, Dwight Webb
Adjunct Associate Professor: Harry J. Richards
Assistant Professors: Eleanor D. Abrams, Casey D. Cobb, Karen A. Erickson, E. Scott Fletcher, Catherine Hindman Reischl, Ruth M. Wharton-McDonald
Lecturers: Celina M. Adams, Timothy J. Churchard, Elizabeth Brooks Heron, Maryann Minard

500. Exploring Teaching
For students considering a teaching career. In-school experiences to develop introductory skills in observation and teaching. On-site seminars for analysis and evaluation. Assessment and advising related to teaching as a career. Prerequisite for further work toward teacher licensure. Minimum of 7 hours a week, plus travel time, required. Prereq: permission. 4 cr. Cr/F.

#653. Humanities and Education: Society and the Formation of Character
Interdisciplinary modular course examines the manner in which society forms character through custom, laws, and formal institutions. Works by Plato, Rousseau, and Dewey explore if and how we can become educated. Students take three successive 5-week modules during the semester. 4 cr. (Not offered every year.)

694. Courses in Supervised Teaching
Supervised Teaching of Music. 8 cr. Cr/F. Supervised Teaching of Adult and Occupational Education. 8 cr. Cr/F. Supervised Teaching of Mathematics. 8 cr. Cr/F.

700. Educational Structure and Change
Organization, structure, and function of American schools; historical, political, social and cross-cultural perspectives; nature and processes of change in education. A) Educational Structure and Change; B) Education in America: Backgrounds, Structure, and Function; C) Governance of American Schools; D) School and Cultural Change; E) Teacher and Cultural Change; F) Social Perspectives of Conflict in the Schools; G) Nature and Processes of Change in Education; H) What Is an Elementary School?; I) Schooling for the Early Adolescent; J) Children with Special Needs: Historical and Institutional Aspects; K) Curriculum Structure and Change; L) Stress in Educational Organizations. 2 and 4 cr. courses offered. **Candidates for teacher licensure must take either 4-cr. course 700A, or 2 cr. each of 700F and 700 G.** Prereq. for teacher licensure: EDUC 500 and junior status. Prereq. for students not seeking teacher licensure: instructor permission. 2 or 4 cr.

701. Human Development and Learning: Educational Psychology
Child development through adolescence, learning theory, cognitive psychology, research in teaching and teacher effectiveness, cross-cultural variability, and evaluation—all applied to problems of classroom and individual teaching and learning. A) Human Development and Learning: Educational Psychology; B) Human Development: Educational Psychology; C) Human Learning: Educational Psychology; D) Developmental Bases of Learning and Emotional Problems; E) Learning Theory, Modification of Behavior, and Classroom Management; F) Cognitive and Moral Development; G) Evaluating Classroom Learning; H) Deliberate Psychological Education; I) Sex Role Learning and School Achievement; J) The Development of Thinking. Each semester 2-cr. and 4-cr. courses are offered. 2-cr. courses emphasize either development or learning. **Candidates for teacher licensure are required to have the 4-cr. course (701A) or 2 cr. each of 701B and 701C.** Prereq. for teacher licensure students: EDUC 500 and junior status. Prereq. for students not seeking teacher licensure: instructor permission. 2 or 4 cr.

703. Alternative Teaching Models
Basic teaching models, techniques of implementation, and relationships to curricula. A) Alternative Teaching Models; B) Curriculum Planning for Teachers; C) Alternative Strategies for Maintaining Classroom Control; D) Social Studies Methods for Middle and High School Teachers; F) Teaching Elementary School Science; G) Language Arts for Elementary Teachers; H) Experiential Curriculum; I) Children with Special Needs: Teaching Strategies for the Classroom Teacher; K) Writing across the Curriculum; L) Learning and LOGO; M) Teaching Elementary School Social Studies. 2-cr. and 4-cr. courses are offered. Teacher education students should be aware of the specific course(s) required for their licensure area. EDUC 703F and M are required for elementary education candidates. EDUC 703D is required for social studies candidates. EDUC 791 is required for science candidates. For all other secondary education candidates, the appropriate methods course in the department of the major is required. See the Schoolhouse Book for specific course listings. Prereq. for teacher licensure: EDUC 500 and junior status. Prereq. for students not seeking teacher licensure: instructor permission. 2 or 4 cr.

705. Alternative Perspectives on the Nature of Education
Students formulate, develop, and evaluate their own educational principles, standards, and priorities. Alternative philosophies of education; contemporary issues. A) Contemporary Educational Perspectives; B) Controversial and Ethical Issues in Education; D) Concepts of Teaching: Differing Views; E) Curriculum Theory and Development; F) Readings on Educational Perspectives; G) Philosophy of Education; I) Education as a Form of Social Control; K) Schooling and the Rights of Children; L) Education, Inequality, and the Meritocracy; M) Readings in Philosophies of Outdoor Education; N) Alternative Perspectives on the Nature of Education; O) Classrooms: The Social Context; P) Teaching: The Social Context; Q) School and Society. 2-cr. and 4-cr. courses are offered. **Candidates for teacher licensure must choose either 4-cr. course 705A, 705B, or 705Q.** Prereq. for students not seeking teacher licensure: instructor permission. 2 or 4 cr.

706. Introduction to Reading Instruction in the Elementary Schools
Reading process; current procedures and materials; diagnostic techniques; practicum experience. Course satisfies reading requirement for prospective elementary teachers in the five-year teacher education program and may be included in the 12 required graduate credits in education at the graduate level. May also be taken for undergraduate credit before entrance into fifth year; in this case the course satisfies reading requirements but is not applicable toward the 12 required graduate credits. Prereq: EDUC 500. 4 cr.

707. Teaching Reading through the Content Areas
Approaches and methods for teaching reading through content materials; coursework includes practical applications through development of instructional strategies and materials. Required for candidates seeking certification in art, biology, chemistry, earth science, general science, physics, or social studies. 2 cr.

720. Introduction to Computer Applications for Education
Examination of major issues related to classroom computer applications: historical development, computer functioning, methods of introduction, problem solving, educational software development and evaluation, psychological and sociological impact of the computer on children and learning. Introduction to classroom applications of the programming language LOGO and authoring languages. A hands-on approach is stressed. Lab. 4 cr.

733. Introduction to the Teaching of Writing
Development of writers, child to adult; ways to respond to writing; organization of the classroom for the teaching of writing. Persons taking the course need to have access to students to carry out course requirements. Prereq: permission. 4 cr.

734. Children's Literature
Interpretive and critical study of literature for children in the elementary and middle schools. Methods of using literature with children. 4 cr.

735. Young Adult Literature
Critical study of the fiction and nonfiction genres that constitute literature written for the adolescent reader. Emphasis will be on literary analysis of young adult literature and its pedagogical uses in middle/junior, high/high school curriculum. 4 cr.

#741. Exploring Mathematics with Young Children
A laboratory course offering those who teach young children mathematics, and who are interested in children's discovery learning and creative thinking, an opportunity to experience exploratory activities with concrete materials. It offers, on the adult level, mathematical investigations through which one may develop the ability to provide children with a mathematically rich environment, to become adept at asking problem-posing questions, and to establish a rationale for doing so. 4 cr.

750. Introduction to Exceptionality
Social, psychological, and physical characteristics of individuals with exceptionalities, including intellectual, sensory, motor, health, and communication impairments. Implications for educational and human service delivery. 4 cr.

751. Educating Exceptional Learners
Foundations of special education and introduction to the techniques of special teaching. Primary application to learners with mild and moderate disabilities. 4 cr.

752. Contemporary Issues in Learning Disabilities
Terminology, etiology, common characteristics, and symptoms; theory and practice in gross-motor, visual, and auditory remediation; testing procedures used in diagnosis and remediation programs. 4 cr.

#753. Contemporary Issues in Behavior Disorders
Nature and scope of emotional disturbances and behavioral disorders in students, including causes, characteristics, treatment implications, and educational programming. 4 cr.

754. Contemporary Issues in Developmental Disabilities
The causal factors, physical and psychological characteristics, and educational and therapeutic implications of mental retardation, cerebral palsy, epilepsy, autism, and related disabilities. Observations of programs and services for individuals with developmental disabilities required. 4 cr.

760. Introduction to Young Children with Special Needs
Needs of children (birth to eight years) with developmental delays or who are at risk for disabilities. Strengths and special needs of such children; causes, identification, and treatment; current legislation; parent and family concerns; program models. 4 cr.

776. Reading for Children with Special Needs
Techniques and procedures for teaching reading to children with special learning needs: the mentally retarded; learning disabled; gifted; and culturally diverse. Emphasis on the implications of providing reading instruction in the least restrictive alternative. 4 cr.

781. Probability and Statistics
Introductory-level coverage of applied probability and statistical methods. Problems selected from many disciplines, with a focus on the behavioral and social sciences, to illustrate the logic and typical application of the techniques. Emphasis on understanding concepts through analyses of prepared data. 4 cr.

785. Educational Assessment
Theory and practice of educational evaluation; uses of test results in classroom teaching and student counseling; introductory statistical techniques. 4 cr.

791. Methods of Teaching Secondary Science
Application of theory and research findings in science education to classroom teaching with emphasis on inquiry learning, developmental levels of children, societal issues, integration of technology, critical evaluation of texts and materials for science teaching, and planning for instruction. Lab. 4 cr.

795, 796. Independent Study
Juniors and seniors only, with approval by appropriate faculty member. Neither course may be repeated. 2 or 4 cr.

797. Seminar in Contemporary Educational Problems
Issues and problems of special contemporary significance, usually on a subject of recent special study by faculty member(s). Prereq: permission. May be repeated for different topics. 1–4 cr.

Electrical and Computer Engineering (EE)

(For program description, see page 60.)

Chairperson: John R. LaCourse
Professors: Kent A. Chamberlin, Ronald R Clark, L. Gordon Kraft, John R. LaCourse, W. Thomas Miller III, Paul J. Nahin, John L. Pokoski, Andrzej Rucinski, Kondagunta Sivaprasad
Adjunct Professors: Robert E. Levin, Stuart M. Selikowitz
Associate Professors: Michael J. Carter, Allen D. Drake, Richard A. Messner
Assistant Professor: Jennifer T. Bernhard
Instructors: Francis C. Hludik, Jr., Paul Latham

401. Perspectives in Electrical and Computer Engineering
Fundamental concepts of analysis and design in electrical engineering presented through an examination of real-world problems selected from diverse application areas. Provides a context for the electrical engineering curriculum and introduces the profession and the activities of electrical engineering. Three lectures and one computer laboratory per week. Prereq: required of ECE students only; others by permission. Writing intensive. 4 cr.

537. Introduction to Electrical Engineering
Fundamentals of electrical engineering. Topics are: circuit elements; signal waveforms; circuit laws and theorems; transfer functions; free, forced, and steady state responses; power calculations; amplifiers; and magnetic circuits. Non-EE majors only. Prereq: MATH 527; PHYS 408. Lab. 4 cr.

541. Electric Circuits
Linear passive circuits beginning with resistive circuits, power and energy relations, mesh and node analysis. Transient and steady-state behavior of simple circuits containing energy storage elements (capacitors, inductors). Introduction to linear active circuits using dependent source models and ideal op amps. Introduction to transfer function and frequency response concepts. For EE majors only. Prereq: MATH 426; pre- or coreq: PHYS 408. Lab and discussion. 4 cr.

543. Introduction to Digital Systems
Fundamental analysis and design principles. Number systems, codes, Boolean algebra, and combinational and sequential digital circuits. Lab: student-built systems using modern integrated circuit technology and an introductory design session on a CAD workstation. Lab. 4 cr.

544. Engineering Analysis
Introduction of approximation and error analysis methods as fundamental engineering tools. Boundary value problems in mechanics, fluid dynamics, and electrostatics. Analysis of engineering problems using integral and differential calculus of functions of several variables. Examination of electrostatics, magnetostatics, and fluid and wave mechanics using vector differential and integral calculus. Prereq: MATH 527. 3 cr.

548. Electronic Design I
Introduction to electronic design for analog signal processing. Linear op amp circuits for amplification and filtering. Use of Laplace techniques for filter specification; simple passive and op amp filter realizations. Discrete active devices (FET and BJT): operating characteristics, biasing considerations, canonical amplifier configurations including differential amplifiers. Prereq: EE 541. Lab. 4 cr.

596. Topics in Electrical Engineering
Topics in electrical engineering. Prereq: permission. 1–4 cr.

603. Electromagnetic Fields and Waves I
Maxwell's equations in integral and differential form with applications to static and dynamic fields. Uniform plane waves in free space and material media. Boundary conditions; simple transmission line theory; parallel plate and rectangular waveguides; simple radiating systems. Prereq: PHYS 408; EE 544 or equivalent. 3 cr.

603H. Electromagnetic Fields and Waves I/ Honors
Same topics as EE 603. Honors students will attend an additional one-hour meeting each week. Prereq: PHYS 408; EE 544 or equivalent. 4 cr.

612. Computer Organization
Basic computer structure, including arithmetic, memory, control, and input/output units; the trade-offs between hardware, instruction sets, speed, and cost. Laboratory experiments involving machine language programming and I/O interfacing using microcomputers. Prereq: CS 410; EE 543; permission. Lab. 4 cr.

617. Junior Laboratory I
Application of laboratory instrumentation to the investigation of active and passive circuit characteristics; introduction to computer-aided design, analysis, and testing; development of report writing and oral presentation skills. Coreq: EE 633; 651. Writing intensive. 2 cr.

618. Junior Laboratory II
Laboratory exercises in the design and analysis of active circuits, techniques of signal processing, and the properties of distributed circuits. Continued development of report writing and oral presentation skills. Prereq: EE 617. Coreq: EE 603. Writing intensive. 2 cr.

633. Signals and Systems I
Mathematical characterization of continuous-time physical systems using time- and frequency-domain concepts. Properties of linear systems described by ordinary differential equations. Fourier analysis of signals and system frequency response functions. Applications to communication and control systems. Introduction to system simulation using computer methods. Prereq: MATH 527 or equivalent. Coreq: EE 544 or equivalent. 3 cr.

633H. Signals and Systems I/Honors
Same topics as EE 633. Honors students will attend an additional one-hour meeting each week. Prereq: MATH 527 or equivalent. Coreq: EE 544 or equivalent. 4 cr.

634. Signals and Systems II
Transient response analysis of linear systems using Laplace transforms, application to feedback control systems. Introduction to discrete-time linear systems; system response determination using Z-transform; elementary design of digital filters and controllers. State variable formulation of dynamical systems. Prereq: EE 633 or permission. 4 cr.

647. Random Processes and Signals in Engineering
Emphasis on applied engineering concepts such as component failure, quality control, noise propagation. Topics include random variables, probability distributions, mean and variance, conditional probability, correlation, power spectral density. Prereq: MATH 426. 4 cr.

651. Electronic Design II
Design of fundamental circuit blocks in electronic systems. Multistage amplifiers; feedback systems and stability; power amplifiers. Nonlinear electronic circuits: oscillators, function generators; clippers and peak detectors; A/D and D/A conversion. Switching mode and logic circuits. Prereq: EE 548. 4 cr.

#681. Teaching Experience
Credit for assisting in the instruction of undergraduate laboratories. Available on a limited basis to students selected by the department chairperson. May be repeated for credit up to a total of 4 credits. 1 cr.

690. Engineering Design Principles I
Lectures, seminars, and discussions related to engineering design and professionalism. Provides background for capstone design experience. Topics include: creativity, design methodology, specification development, total quality management, ethics, safety, reliability, aesthetics, and preparation for oral and written reports. .5 cr. Cr/F.

691. Engineering Design Principles II
Continuation of EE 690. .5 cr. Cr/F.

Some 700-level courses are offered subject to adequate student demand. Most 700-level courses require writing reports and giving oral presentations.

704. Electromagnetic Fields and Waves II
Loop antennas; aperture and cylindrical antennas; self and mutual impedance; receiving antennas and antenna arrays; bounded plane waves; rectangular and cylindrical waveguides; waveguide discontinuities and impedance matching; solid state microwave sources. Prereq: EE 603. 4 cr.

707. Computer Engineering
Software engineering principles and practices; computer-aided design and computer-aided engineering methodologies; computer architecture comparisons and tradeoffs; sampled data systems. Prereq: EE 612; junior standing or permission. Lab. 4 cr.

711. Digital Systems
Digital design principles and procedures, including top-down design techniques, introduction to VHDL and digital synthesis, prototyping and documentation methods, and realistic considerations such as grounding, noise reduction, loading, and timing; digital design and development tools; computer-aided design using microprocessor development systems and engineering workstations

including hands-on experience with state-of-the-art design automation systems. Prereq: EE 707; permission. Lab. 4 cr.

714. Introduction to Digital Signal Processing
Introduction to digital signal processing theory and practice, including coverage of discrete time signals and systems, frequency domain transforms and practical spectral analysis, digital filter terminology and design, and sampling and reconstruction of continuous time signals. Laboratory component providing an introduction to DSP design tools and real-time algorithm implementation. 50% theory, 50% design. ECE majors only. Prereq: EE 634; senior standing; programming experience; permission. Lab. 4 cr.

715. Introduction to VLSI
Principles of VLSI (Very Large Scale Integrated) systems at the physical level. CMOS circuit and logic design, CAD tools, CMOS system case studies. Students exercise the whole development cycle of a VLSI chip: design, layout, and testing. Design and layout performed during Semester I. The chips are fabricated off campus and returned during Semester II, when they are tested by students. An IA grade is given at the end of Semester I. Prereq: EE 707. 4 cr.

717. Introduction to Digital Image Processing
Digital image representation; elements of digital processing systems; sampling and quantization, image transformation including the Fourier, the Walsh, and the Hough transforms; image enhancement techniques including image smoothing, sharpening, histogram equalization, and pseudocolor processing; image restoration fundamentals. Prereq: EE 633 or equivalent; EE 647; CS 410 or equivalent experience; permission. Lab. 4 cr.

#745. Fundamentals of Acoustics
Acoustic wave equation for air; laws of reflection, refraction, and absorption; characteristics and measurement of acoustical sources; human perception of sound, loudness, intensity; microphones; acoustical materials; problems in environmental sound control; ultrasonics; architectural acoustics. Prereq: PHYS 408; MATH 527; permission. Lab. 4 cr.

757. Fundamentals of Communication Systems
Discussions of deterministic signals, Fourier spectra, random signals and noise, baseband communication, analog and digital modulation schemes, and system signal-to-noise ratio. Prereq: EE 633 or equivalent; EE 647; permission. Lab. 4 cr.

758. Communication Systems
Design of high-frequency communication systems. RF amplification, modulators for AM and FM systems, receiving techniques, antennas, free-space propagation, propagation characteristics of the ionosphere. Prereq: EE 603; EE 757 or equivalent; permission. Lab. 4 cr.

760. Introduction to Fiber Optics
Basic physical and geometric optics; solution of Maxwell's equations for slab waveguides and cylindrical waveguides, of both step index and graded index profiles; modes of propagation and cutoff; polarization effects; group and phase velocity; ray analysis; losses; fabrication; sources; detectors; couplers; splicing; cabling; applications; system design. Prereq: PHYS 703 or EE 603 or permission. Lab. 4 cr.

#761. Optical Engineering
First-order imaging optics, thin and thick lenses, aberrations, mirrors, stops, apertures, gratings, prisms, resolution, interferometry, diffraction, ray tracing, design of optical instruments, image evaluation, modulation transfer function, optical system design by computer. Prereq: PHYS 408; MATH 527; or permission; CS 410 or equivalent experience. Lab. 4 cr.

772. Control Systems
Development of advanced control system design concepts such as Nyquist analysis; lead-lag compensation; state feedback; parameter sensitivity; controllability; observability; introduction to nonlinear and modern control. Includes interactive computer-aided design and real-time digital control. Prereq: EE 634 or permission. (Also offered as ME 772.) Lab. 4 cr.

775. Applications of Integrated Circuits
Design and construction of linear and nonlinear electronic circuits using existing integrated circuits. Limitations and use of operational amplifiers. Laboratory course in practical applications of nondigital integrated circuit devices. Prereq: EE 651; permission. Lab. 4 cr.

777. Collaborative Engineering
Study of processes in which engineers from diverse disciplines cooperate to specify, design, manufacture, test, market, and maintain a product. Classes are organized in both technical and nontechnical flexible modules. Technical topics are advanced and relevant to project being developed, such as related research, technology, design methodology, and CAD tools. Nontechnical topics include ISO9000 quality system, engineering management, budget considerations, team building, communication and leadership skills, and concurrent engineering principles. The course utilizes collaborative engineering by team development of an engineering project, often a research oriented proof-of-concept prototype. Project is developed using ISO9000 principles and the Internet, accompanied by seminars and discussion sessions run by students who have been designated project leaders. Prereq: Senior standing. Lab. 4 cr.

#781. Physical Instrumentation
Analysis and design of instrumentation systems. Sensors, circuits, and devices for measurement and control. Elements of probability and statistics as applied to instrument design and data analysis. Transmission, display, storage, and processing of information. The design, implementation, testing, and evaluation of a relevant instrument system is an integral part of the course. Prereq: senior standing in EE or equivalent; EE 651; permission. Lab. 4 cr.

784. Biomedical Instrumentation
Principles of physiological and biological instrumentation design including transducers, signal conditioning, recording equipment, and patient safety. Laboratory includes the design and use of instrumentation for monitoring of electrocardiogram, electromyogram, electroencephalogram, pulse, and temperature. Current research topics, such as biotelemetry, ultrasonic diagnosis, and computer applications. Prereq: ZOOL 507-508 or equivalent; EE 651; permission. Lab. 4 cr.

#785. Underwater Acoustics
Vibrations, propagation, reflection, scattering, reverberation, attenuation, sonar equations, ray and mode theory, radiation of sound, transducers, and small- and large-signal considerations. Prereq: permission. 4 cr.

790. Engineering Design Experience
Capstone engineering design project that draws on previous coursework and involves many of the following features: synthesis, analysis, alternative approaches, modeling, construction, simulation, testing, and evaluation. Designs must consider realistic constraints such as time, economics, safety, reliability, functionality, social and environmental implications, practicality, etc. Oral and written reports required. Normally taken by EE seniors in conjunction with other technical electives or work experience. Writing intensive. 0 cr. Cr/F.

795. Electrical Engineering Projects
Laboratory course. Students either join a department research project or engage in a project in an area of staff interest. Prereq: acceptance by staff member. 1–4 cr.

795H. Senior Honors Project
Independent analytical or laboratory study under the guidance of a faculty member. A written report is required. Prereq: senior EE honors standing. 4 cr. for 1 semester or 2 cr. for each of 2 semesters with IA given at end of first semester.

796. Special Topics in Electrical Engineering
New or specialized courses and/or independent study. Prereq: permission. 1–4 cr.

Engineering Technology (ET)

(For program description, see page 62.)

Chairperson: Ralph W. Draper
Adjunct Professor: Joseph B. Murdoch
Associate Professors: Ralph W. Draper, David A. Forest

Permission of instructor is a prerequisite to all engineering technology courses for nonmajors.

630. Analytical Methods in Engineering Technology
Review of college-level mathematics including differential and integral calculus with applications and advanced topics, e.g., Fourier analysis, Laplace transform technique, and probability and statistics. Prereq: engineering technology majors only. 2 cr.

637. Heat and Fluid Power I
Work and heat, first and second laws of thermodynamics, heat engines and refrigerators applied to various cycles (power plants, turbines, jet engines, etc.). Field trips. Prereq: differential and integral calculus; physics. Lab. 4 cr.

638. Heat and Fluid Power II
Continuation of 637 for MET students only. Further applications of thermodynamics. Additional topics include heat transfer and fluid dynamics. Prereq: ET 637 or equivalent. Lab. 4 cr.

641. Production Systems
Market forecasting; waiting line theory; manufacturing inventories and their control; production scheduling; quality control. Prereq: differential and integral calculus. 3 cr.

644. Mechanical Engineering Technology Concepts in Design and Analysis
Kinematics, kinetics, work and energy, fluids, heat transfer; application of these concepts to problems in mechanical design. Prereq: strength of materials and dynamics and ET 637. 4 cr.

649. Production Tooling and Processes
A design course offered as an alternative to ET 644, Mechanical System Design. Application of CAD and related techniques to three design projects which emphasize mechanical, electrical, pneumatic, and hydraulic systems. Five field trips to manufacturing companies. Three possible projects might be: 1) design a machine tool, including all electrical/electronic control systems to ensure proper operation, measurement, and MIS log interfacing; 2) design a tooling complex for making a part or assembly, including tolerancing, failure detection, JIT, visual inspection, and ease of maintenance; 3) design a material handling system to ensure production rate requirements, ergonomics, safety, scrap processing, and packaging. 4 cr.

671. Digital Systems
Digital systems design and applications using TTL and CMOS devices, design of systems, and interfacing. Digital design project required. Prereq: introductory digital design. Special fee. Lab. 4 cr.

674. Control Systems and Components
Topics include linear systems analysis, the Laplace transform and its properties, controllers, root locus technique, transient response analysis, first- and second-order systems, error analysis, and control system design. Prereq: differential and integral calculus. Lab. 4 cr.

675. Electrical Technology
Electrical circuits: DC and AC network analysis, power factors, transformers, power supplies. Electronic circuits—diodes, transistors and operational amplifiers. Digital circuits and introduction to computer-aided engineering. Prereq: differential and integral calculus. Lab. 4 cr.

677. Analog Systems
Operational amplifiers. Transducers and measurement systems. Frequency response. Grounding and shielding. Signal and power interfacing techniques. Design project. Prereq: intro. analog design. Special fee. Lab. 4 cr.

678. Design and Applications of Robust Instrumentation
Design methods for analysis and synthesis of reliable and accurate state-of-the-art circuits and systems for use in precision measurements in severe conditions. A design project will be required. Prereq: Majors only or permission. Lab. 4 cr.

680. Communications and Fields
Topics include Fourier series analysis; the Fourier transform and its properties; convolution; correlation including PN sequences; modulation theory; encoding and decoding of digital data (NRZ-M, NRZ-S, RZ, Biphase-L, and Manchester); antennas and antenna pattern; Radar Range Equation; and an introduction to information theory. Prereq: differential and integral calculus. Lab. 4 cr.

695. Independent Study
Individual reading, writing or laboratory work carried out under the tutelage of a faculty member. Prereq: approval of the adviser. 1–4 cr.

696. Topics in Mechanical Engineering
New or specialized courses not covered in regular course offerings. Prereq: permission. May be repeated to a maximum of 4 cr. 1–4 cr.

697. Topics in Electrical Engineering Technology
New or specialized courses not covered in regular course offerings. Prereq: permission. May be repeated for a maximum of 4 credits. 1–4 cr.

706. Internship
On-the-job skill development through fieldwork in industry. Normally, supervision is provided by a qualified individual in the organization with consultation by a faculty sponsor. Written report required. Internships may be part or full time, with course credits assigned accordingly. May be repeated to a maximum of 4 credits. 1–4 cr. Cr/F.

733. Business Organization and Law
Corporations; proprietorships; product liability; contracts; federal agencies; commercial paper; conditions of employment; business ethics; bankruptcy; U.C.C. Special fee. Writing intensive. 4 cr.

734. Economics of Business Activities
Elementary financial accounting; compound interest and time value of money; sources of capital; cost estimating; depreciation; risk and insurance; personal finance. Prereq: differential and integral calculus. Special fee. 4 cr.

745. Instrumentation
Statistics of experimentation; quantity standards and measurement; design of experiments; use of laboratory gear including dynamometer; field trips. Prereq: differential and integral calculus; ET 644 or equivalent. Lab. 4 cr.

748. Applications of Design of Experiments
A seminar and project course. Problems in design of robust products and manufacturing processes; statistical experiment design methods. Classes are held weekly, with project work to be done between classes. Session to present project results held at end of semester. Both classical and Taguchi approaches to designed experiments will be studied, using a case approach, and emphasizing the applications of these problems. 2–4 cr.

750. Computer Integrated Manufacturing
Introduction to the basic concepts of manufacturing complex products with complex processes. This manufacturing implies a strong use of, and reliance on, the computer and data processing technologies. All aspects relative to product and process: planning, design, manufacturing, and shipping are addressed from a variety of perspectives. Elements of the production interfaces among these elements are defined. Methods and techniques for studying, managing, and engineering productivity are explored. 3 cr.

751. Mechanical Engineering Technology Project
Students are required to find solutions to actual technological problems in design, fabrication, and testing as posed by industry. Students define the problem, prepare a budget, and work with the client company to research, design, build, and test the software and/or hardware needed. Prereq: senior standing in ET. A year-long course: 2 or 4 cr.; an IA grade (continuous course) given at the end of first semester. Withdrawal from course results in loss of credit.

762. Illumination Engineering
Radiation; spectra, wave, and particle nature of light; physics of light production, light sources and circuits, luminaires; science of seeing, color theory, control of light, measurements, light and health, lighting calculations. Prereq: MATH 426, PHYS 408 or equivalent. Lab. 4 cr.

763. Lighting Design and Applications
Lighting design process, modeling, interior and exterior lighting calculation and design, flux transfer, form and configuration factors, lighting quality and aesthetics, daylighting calculations, lighting economics, lighting power and energy analysis, selected applications of light in interior and exterior spaces. Prereq: ET 762 or equivalent. 2–4 cr.

783. Advanced Electronic Design Methods
Design methods for analysis and synthesis of state-of-the-art circuits and systems, with real-world examples. A design project will be required. Laboratory work will form an important part of the course. Prereq: intro. analog and digital design. Special fee. Lab. 4 cr.

790. Microcomputer Technology
Microcomputer systems design, including assembly language, interfacing, processor timing and loading, and interprocessor communications via local area networks. Hardware, software, and architecture of both Intel 80X86 and Motorola 68XX0 microprocessors. Microcomputer applications with emphasis on lab work using the Motorola HC11 microcontroller. Prereq: ET 671. Special fee. Lab. 4 cr.

791. Electrical Engineering Technology Project
Students are required to find solutions to actual technological problems in design, fabrication, and testing, as posed by industry. Students define the problem, prepare a budget, and work with the client company to research, design, build, and test the software and/or hardware needed. Prereq: senior standing in ET. Special fee. A year-long course: 2 or 4 cr.; an IA grade (continuous course) given at end of first semester. Withdrawal from course results in loss of credit.

English (ENGL)

(For program description, see page 36.)

Chairperson: Rochelle Lieber
Professors: Janet Aikins, Thomas A. Carnicelli, Mary Morris Clark, Robert J. Connors, Michael V. DePorte, Karl C. Diller, Walter F. Eggers, Burt H. Feintuch, Michael K. Ferber, Lester A. Fisher, Elizabeth H. Hageman, Jane T. Harrigan, Jean E. Kennard, Rochelle Lieber, Mekeel McBride, Andrew H. Merton, Thomas R. Newkirk, Susan Schibanoff, Charles D. Simic, Mark R. Smith, David H. Watters
Associate Professors: John M. Archer, Brigitte Gabcke Bailey, Elizabeth Jane Bellamy, Margaret-Love G. Denman, John Richard Ernest, Diane P. Freedman, Cinthia Gannett, Susan Margaret Hertz, Romana C. Huk, James Krasner, Douglas M. Lanier, John S. Lofty, Lisa Watt MacFarlane, Sarah Way Sherman, Sandhya Shetty, Patricia A. Sullivan, Rachel Trubowitz
Assistant Professors: Charlotte M. Bacon,

Monica E. Chiu, Peter J. Mascuch, Lisa C. Miller, Naomi G. Nagy

Before registering, students should see detailed course descriptions printed by the department.

English 401 is a prerequisite for all English courses but 400.

400. English as a Second Language
Improves the competence of foreign students in listening comprehension, speaking, reading, and writing. Recommended as preparation for ENGL 401. May be repeated up to a total of 16 cr. Writing intensive. Var. 1–16 cr.

401. Freshman English
Training to write more skillfully and to read with more appreciation and discernment. Frequent individual conferences for every student. Special fee. Writing intensive. 4 cr.

401A. Freshman English for ESL Students
A special section of Freshman English for students whose native language is not English. Training to write more skillfully and to read with more appreciation and discernment, with special attention to the problems of non-native speakers of English. Supplemental work on listening and speaking as necessary. Frequent individual conferences for every student. Special fee. Writing intensive. 4 cr.

#403. Introduction to the Study of Literature
The art of thoughtfully enjoying various kinds of literature, the substance and language of literature, and literary techniques. Writing intensive. 4 cr.

500. Writing about Reading: Writing about Nonfiction
Emphasis on close reading of a variety of nonfiction sources and on intensive writing to develop interpretive skills. Prereq: ENGL 401 or permission. Special fee. Writing intensive. 4 cr.

501. Introduction to Prose Writing
Nonfiction writing; weekly papers and frequent conferences. May be repeated for credit with the approval of department chairperson. Special fee. Writing intensive. 4 cr.

503. Persuasive Writing
Writing of all types of persuasive nonfiction prose, including argumentative essays and position papers. Special attention to argumentative structures and analysis of audiences. Weekly papers of varying lengths and formats, frequent conferences. Special fee. Writing intensive. 4 cr.

505. Introduction to Linguistics
Overview of the study of language: universal properties of human language, Chomsky's innateness hypothesis, language acquisition in children, dialects and language variation, language change. Includes introduction to modern grammar (phonology, syntax, and semantics) and to scientific linguistic methodology. (Also offered as LING 505.) 4 cr.

#511. Major Writers in English
In-depth study and discussion of a few American and/or British writers. Topics and approaches vary depending on instructors. Writing intensive. 4 cr.

#512. Introduction to American Literature
Works of major American writers from Irving to Faulkner, with emphasis on how to adapt and present the material to high school English classes. Open only to English teaching majors. 4 cr. (Not offered every year.)

513, 514. Survey of British Literature
Selected works in poetry and prose considered in chronological order and historical context. Attention to the works and to the ideas and tastes of their periods. 513: Beowulf through 18th century. 514: 1800 to the present. Writing intensive. 4 cr.

515, 516. Survey of American Literature
515: From the beginning of American literature to the Civil War. 516: From the Civil War to the present. Writing intensive. 4 cr.

517. Introduction to African American Literature and Culture
An introduction to African American literature in the context of a variety of cultural perspectives. Course topics may include: major writers, literary genres, historical periods, Harlem Renaissance, Black Arts Movement, fine and folk arts, religion, music, and film. (Also offered as AMST 502.) Writing intensive. 4 cr.

518. The Bible as Literature
Literature of the Old and New Testaments and the Apocrypha, primarily in the King James version. Writing intensive. 4 cr.

519. Introduction to Critical Analysis
Critical analysis of fiction, poetry, and drama. Frequent short papers. This course, or 529, is a prerequisite with a minimum grade of C for those intending to declare an English major. Students may not take both ENGL 519 and 529 for credit. Writing intensive. 4 cr.

#520. Literature and the History of Ideas
Interdisciplinary study of literary works as influenced and illuminated by the concepts of philosophers, historians, and scientists. Barring duplication of subject, may be repeated for credit. Writing intensive. 4 cr.

521. The Nature Writers
Fiction, poetry, and nonfiction books on the natural environment. Such books as Thoreau's Walden or Maine Woods, Leopold's Sand County Almanac, Beston's Outermost House, Dillard's Pilgrim at Tinker Creek—books by naturalists who observe nature vividly and knowingly and who write out of their concern for the environment. Writing intensive. 4 cr.

#522. American Literary Folklore
Folktales, songs, proverbs, beliefs, superstitions, and their use by such American authors as Irving, Hawthorne, Longfellow, Melville, Thoreau, Twain, Frost, and Faulkner; some emphasis on oral folk culture of New Hampshire. Writing intensive. 4 cr.

523. Madness in Literature
How various writers depict insanity, and how they approach the problem of determining what attitudes and what behavior are truly sane. Emphasis on 19th- and 20th-century works, but works from earlier periods also considered. Euripides' The Bacchae, Shakespeare's King Lear, Cervantes's Don Quixote, Hoffman's The Golden Pot, Dostoevsky's Notes from the Underground, Robbe-Grillet's The Voyeur, Nabokov's Pale Fire, and other texts. Writing intensive. 4 cr.

525. Popular Culture in America
Cultural expression in popular media. Verbal arts (best sellers, magazines, newspapers, speeches); some attention to television, film, comics, popular music. The multidisciplinary approach deals with historical context, cultural institutions, and distinctions between "popular arts" and "great literature." Recurrent images, situations, and themes are investigated to see what values are celebrated and what fears are revealed. Writing intensive. 4 cr.

529. Writing about Literature
Close reading of poetry, fiction, and drama. Frequent papers. A prerequisite with a minimum grade of C for those intending to declare an English major. Students may not take both ENGL 519 and 529 for credit Writing intensive. 4 cr.

533. Introduction to Film Studies
A survey of the international development of the motion picture from the silent period to the present, emphasizing film's narrative practices. The course introduces students to the study of the art, history, technology, economics, and theory of cinema. Films and film makers of various nations, periods, movements, and genres examined. Special fee. Writing intensive. 4 cr.

581. Introduction to Postcolonial Literatures in English
Survey of contemporary Asian, African, and Caribbean fiction, drama, travelogues, essays, and poetry from the 1950s to the present. Introduction to political, historical, and cultural contexts within which these forms are produced. Writing intensive. 4 cr.

585. Introduction to Women in Literature
Survey of images of women in literature. Content and approach vary depending on instructor. Writing intensive. 4 cr.

586. Introduction to Women Writers
Survey of women writers. Content and approach vary depending on instructor. Writing intensive. 4 cr.

595. Literary Topics
Various faculty members investigate topics of special interest at a level appropriate for nonmajors. Past topics have included Irish literature, animals in literature, and literature of the Vietnam War. See department for details of current offerings. Writing intensive. 1–4 cr.

605. Introduction to Linguistic Analysis
Introduces analysis methods and problem solving in phonology, morphology, and syntax using data from many languages. Emphasis will be both practical (learning how to describe the grammar and sound system of a language) and theoretical (understanding languages' behavior). Prereq: ENGL/LING 505, or permission. (Also offered as LING 605.) 4 cr.

#607. The American Character: Religion in American Life and Thought
Interdisciplinary study of the American religious experience and its relationship to other aspects of American culture, taught by a team of three specialists, each in a different discipline: American intellectual and cultural history, American literature, and American church history. Central emphasis on several transforming themes of the 19th century and their effects upon the interplay of religion and society. (Also offered as HIST 607, HUMA 607, and RS 607.) Writing intensive. 4 cr.

608. Arts and American Society: Women Writers and Artists, 1850–Present
Team-taught course studying the impact of gender definitions on the lives and works of selected American artists. Considers lesser-known figures such as Fannie Fern, Lilly Martin Spencer, and Mary Hallock Foote as well as better-known artists such as Willa Cather and Georgia O'Keeffe. Prereq: permission or one of the following: WS 401, HIST 566, ENGL 585, 586, 685, 785, or a 600-level art history course. (Also offered as ARTS 608, HIST 608, and HUMA 608.) Writing intensive. 4 cr.

#609. Ethnicity in America: The African American Experience in the Twentieth Century
Team-taught course investigating music, literature, and social history of African American America in the period of the Harlem Renaissance, in the Great Depression, World War II, and in the 1960s. Special attention to the theme of accommodation with and rejection of dominant white culture. (Also offered as HUMA 609 and MUSI 609.) Writing intensive. 4 cr.

610. Regional Studies in America: New England Culture in Changing Times
Team-taught course investigating some of the major contributions New England has made to American life. Focusing on three periods: the Puritan era, 1620–90; the Transcendental period, 1830–60; and the period of emerging industrialism in the late 19th century. (Also offered as ARTS 610, HIST 610, and HUMA 610.) Not for art studio major credit. Writing intensive. 4 cr.

616A, B, C, D. Studies in Film
Advanced, focused study of the narrative, dramatic, and poetic practices of cinema, within one of four possible subject areas: A) Genre; B) Authorship; C) Culture and Idealogy; D) Narrative and Style. Precise issues and methods may vary, ranging from general and specific considerations of how a given subject area involves film theory, criticism, and history, to its use in diverse analyses of selected national cinemas, periods, movements, and filmmakers. Barring duplication of any of the four subject areas, and/or duplication of material taken for credit in CNM 650, course may be repeated for credit. Detailed course descriptions available in English department office during pre-registration. Prereq: ENGL 533, or CMN 550, or permission. Special fee. Writing intensive. 4 cr.

619. Critical Approaches to Literature
Selected methods of literary criticism applied to fiction, poetry, and/or drama with critical approaches varying from year to year. A follow-up of 519, course provides a second semester of training in critical reading and writing, examining such major modern strategies as formalist, biographical, archetypal, psychological, sociological, historical, feminist, and structuralist criticism. Prereq: ENGL 519, 529, or equivalent. Writing intensive. 4 cr.

620. Applied Experience in English
Students who have an opportunity for appropriate career-oriented work experience may arrange with a faculty sponsor to add an academic component. The work must be related to the English major, and the employer must be an established organization approved by Career Services. Research and writing will be required in addition to the job experience. Registration requires permission of employer, faculty sponsor, and major advisor. This course does not count toward the English major or minor. May be repeated with permission to a maximum of 8 credits. Cr/F. Writing intensive. 1–4 cr.

621. Newswriting
Workshops to develop reporting and writing skills. Prereq: ENGL 501 or equivalent; written permission. May be repeated for credit with the approval of the department chairperson. Special fee. Writing intensive. 4 cr.

623. Essay Writing
Intensive writing course emphasizing experimentation with a variety of essay forms. Also reading and discussion of contemporary essays. Prereq: ENGL 501 and written permission of instructor. Special fee. Writing intensive. 4 cr.

625, 626. Writing Fiction
Workshop in the fundamental techniques of fiction writing. Student work is criticized by fellow students; individual conferences with instructor. May be repeated for credit with the approval of the department chairperson. Prereq: ENGL 501 or equivalent. Written permission of instructor required for registration. Special fee. Writing intensive. 4 cr.

627, 628. Writing Poetry
Workshop in the fundamental techniques of poetry writing. Class discussion and criticism of poems written by students. Individual conferences with instructor. Prereq: ENGL 501 or equivalent. Written permission of instructor required for registration. May be repeated for credit with the approval of the department chairperson. Special fee. Writing intensive. 4 cr.

630. Poetry
American and British poetry. Various poetic techniques and their demonstration. See course descriptions available in department office for further information. Writing intensive. 4 cr. (Not offered each semester.)

631. The Drama
Nature and types of drama illustrated by major English, American, and (translated) European plays. How to read a play. Live and filmed performances studied as available. Writing intensive. 4 cr.

632. Fiction
Modern novels and/or short stories. The ways in which fiction communicates its meanings; the tools and methods at the fiction writer's disposal, primarily as they function in individual works. See course descriptions available in department office for further information. Writing intensive. 4 cr. (Not offered each semester.)

649. Studies in British Literature and Culture
Special topics in British studies, varying from year to year. Writing intensive. 4 cr. (Not offered every year.)

650. Studies in American Literature and Culture
Special topics in American studies, varying from year to year. Writing intensive. 4 cr. (Not offered every year.)

651, 652. Comparative Literature
Comparative studies of major authors representative of important periods of world literary achievement. 651: Homer to Dante; common themes and the development of the epic tradition in early Western literature. 652: Renaissance to modern. Topics and approaches vary from semester to semester. Writing intensive. 4 cr.

#655. Chaucer
Study of Chaucer's earlier works in the context of their continental sources and analogues. All readings in translation. Writing intensive. 4 cr.

657. Shakespeare
Ten major plays representative of the main periods of Shakespeare's career and the main types of drama which he wrote (tragedy, comedy, history). Live and filmed performances included as available. Restricted to undergraduates and designed for both English majors and students majoring in other fields. Writing intensive. 4 cr.

#681. Introduction to African Literatures in English
In-depth study of writers, literary movements, political contexts, and historical pressures that have shaped and continue to shape African literatures in the colonial and postcolonial periods. Primary focus on Anglophone texts but possibly some literature in translation. Writing intensive. 4 cr.

685. Women's Literary Traditions
Intensive study of themes, topics, and techniques in women's literature. Topics vary from year to year. Writing intensive. 4 cr.

#690. Introduction to African American Literature in America
Selected prose, fiction, drama, and poetry. Individual works and historical-cultural background. Course varies from year to year. Writing intensive. 4 cr.

693, 694. Special Topics in Literature
A) Old English Literature; B) Medieval Literature; C) 16th Century; D) 17th Century; E) 18th Century; F) English Romantic Period; G) Victorian Period; H) 20th Century; I) Drama; J) Novel; K) Poetry; L) Nonfiction; M) American Literature; N) A Literary Problem; O) Literature of the Renaissance. The precise topics and methods of each section vary. Barring duplication of subject, course may be repeated for credit. For details, see course descriptions available in the English department. Writing intensive. 4 cr. (Not offered every year.)

695, 696. Senior Honors
Open to senior English majors who, in the opinion of the department, have demonstrated the capacity to do superior work; permission required. An honors project consists of supervised research leading to a substantial thesis or the writing of poetry or fiction portfolio. Required of students in the honors in major program. Writing intensive. 4 cr. (Not offered every year.)

697, 698. English Major Seminar
Intensive study of specialized topics that vary from year to year. Enrollment in each seminar is limited to 15 so that all students can take an active part in discussion and work closely with the instructor on their papers. Prereq: a grade of B or better in ENGL 519 or 529, and permission. For details, see course description available in the department office. Writing intensive. 4 cr.

701. Advanced Writing of Fiction
Workshop discussion of advanced writing problems and readings of students' fiction. Individual

conferences with instructor. Prereq: 625, 626, or equivalent; written permission of instructor required for registration. May be repeated for credit with the approval of the department chairperson. Special fee. Writing intensive. 4 cr.

703, 704. Advanced Nonfiction Writing
Workshop course for students intending to write publishable magazine articles or nonfiction books. Equal stress on research and writing techniques. Prereq: ENGL 621; 722 recommended. Written permission of instructor required. May be repeated for credit with the approval of the department chairperson. Special fee. Writing intensive. 4 cr.

705. Advanced Writing of Poetry
Workshop discussion of advanced writing problems and submitted poems. Individual conferences with instructor. Prereq: ENGL 627, 628, or equivalent; written permission of instructor. May be repeated for credit with the approval of the department chairperson. Special fee. Writing intensive. 4 cr.

707. Form and Theory of Fiction
A writer's view of the forms, techniques, and theories of fiction. The novels, short stories, and works of criticism studied vary, depending on the instructor. Writing intensive. 4 cr.

708. Form and Theory of Nonfiction
A writer's view of contemporary nonfiction, emphasizing the choices the writer faces in the process of research and writing. Writing intensive. 4 cr. (Not offered every year.)

709. Form and Theory of Poetry
A writer's view of the problems, traditions, and structures of poetry. Writing intensive. 4 cr.

710. Teaching Writing
Introduction to various methods of teaching writing. Combines a review of theories, methods, and texts with direct observation of teaching practice. Writing intensive. 2 or 4 cr.

711. Editing
Emphasis on newspaper editing but principles applicable to magazine and book editing also covered. Prereq: ENGL 621; permission. Special fee. Writing intensive. 4 cr.

713, 714. Literary Criticism
Major critics from Plato to the present; the chief critical approaches to literature. Writing intensive. 4 cr. (Not offered every year.)

715. TESL: Theory and Methods
How linguistic, psychological, sociological, and neurological theory influence or even determine the choice of methods of language teaching. Research on second language acquisition and bilingualism, language aptitude, and the cultural context of language acquisition. Introduction to standard and exotic methods of language teaching. Writing intensive. 4 cr.

716. Curriculum Design, Materials, and Testing in English as a Second Language
Study of the problems in designing an effective teaching program for various types of ESL students. Competence and aptitude testing; choosing and adapting materials for ESL classes. Writing intensive. 4 cr.

#718. English Linguistics and Literature
Introduction to linguistics for students of literature. Includes a survey of the grammar of English (phonology, morphology, syntax, dialect variation, historical change) with applications to the analysis of the language of poetry and prose. Writing intensive. 4 cr. (Not offered every year.)

719. Sociolinguistics Survey
How language varies according to the characteristics of its speakers: age, sex, ethnicity, attitude, time, and class. Quantitative analysis methods; relationship to theoretical linquistics. Focus is on English, but some other languages are examined. Prereq: 505 or permission. 4 cr.

720. Journalism Internship
Students intending to pursue careers in journalism spend a semester working full or part time for a daily newspaper under close supervision of editors. Reporting is stressed, but students may do some editing as well. The number of internships is very limited. Prereq: ENGL 621, ENGL 722, permission. Writing intensive. 1–16 cr.

721. Advanced Reporting
Students learn advanced techniques for developing story ideas and acquiring information from people and documents. Discussion of legal and ethical issues facing reporters. Prereq: ENGL 621 and written permission. Special fee. Writing intensive. 4 cr.

722. Feature Writing
Students refine interviewing, reporting, and writing techniques. Emphasis on in-depth features. Prereq: ENGL 621; permission of instructor. May be repeated for credit with the approval of department chairperson. Special fee. Writing intensive. 4 cr.

725, 726. Seminar in English Teaching
In this seminar on teaching English at the middle- and secondary-school levels, students meet the requirements for both ENGL 710, Teaching Writing, and ENGL 792, Teaching Secondary School English. The two-semester course integrates the teaching of reading, writing, speaking, and listening, addressing both theoretical and practical issues. Through the study of different approaches, students develop their own philosophies of instruction. Writing intensive. 4 cr.

732. Folklore and Folklife
Examines the materials and methods used to study folklore and folklife, emphasizing the historical context and development of folklore studies in North America and Europe, field research, performance theory, and other topics. (Also offered as ANTH 698.) Writing intensive. 4 cr.

739. American Indian Literature
Close study of traditional and/or contemporary American Indian literature and folklore with historical and cultural background. Writing intensive. 4 cr.

741. Literature of Early America
Prose and poetry of the periods of exploration, colonization, early nationalism, Puritanism, Enlightenment. Individual works and historical-cultural background. Writing intensive. 4 cr. (Not offered every year.)

742. American Literature, 1815–1865
Fiction, nonfiction, and poetry in the period of romanticism, transcendentalism, nationalism. Individual works and cultural background. Writing intensive. 4 cr. (Not offered every year.)

743. American Literature, 1865–1915
Fiction, nonfiction, and poetry in the period of realism, naturalism, industrialism, big money. Individual works and cultural background. Writing intensive. 4 cr.

744. American Literature, 1915–1945
Fiction, poetry, and drama in the period of avant-garde and leftism, jazz age, and Depression. Individual works and cultural background. 4 cr.

745. Contemporary American Literature
A gathering of forms, figures, and movements since 1945. Individual works and cultural background. Writing intensive. 4 cr.

#746. Studies in American Drama
Topics vary from year to year. Examples: 20th-century American drama; contemporary playwrights; theatricality in American life. Writing intensive. 4 cr. (Not offered every year.)

747. Studies in American Poetry
Topics vary from year to year. Examples: poets of the open road; Pound and his followers; major American poets; contemporary American poetry. Writing intensive. 4 cr. (Not offered every year.)

748. Studies in American Fiction
Topics vary from year to year. Examples: the romance in America; the short story; realism and naturalism; the city novel; fiction of the thirties. Writing intensive. 4 cr.

749. Major American Authors
Intensive study of two or three writers. Examples: Melville and Faulkner; Fuller, Emerson, and Thoreau; James and Wharton; Dickinson and Frost. Writing intensive. 4 cr.

750. Special Studies in American Literature
Topics vary from year to year. Examples: the Puritan heritage; ethnic literatures in America; landscape in American literature; five American lives; pragmatism; American humor; transcendentalism; women regionalists. Writing intensive. 4 cr.

751. Medieval Epic and Romance
The two major types of medieval narrative; comparative study of works from England, France, Germany, and Iceland, including Beowulf, Song of Roland, the Nibelungenlied, Njal's Saga, and Malory's Morte d'Arthur. All works read in modern English translations. Writing intensive. 4 cr. (Not offered every year.)

752. History of the English Language
Evolution of English from the Anglo-Saxon period to the present day. Relations between linguistic change and literary style. Writing intensive. 4 cr. (Not offered every year.)

753. Old English
Introduction to Old English language and literature through the reading of selected poetry and prose. 4 cr.

754. Beowulf
A reading of the poem and an introduction to the scholarship. Prereq: ENGL 753. Writing intensive. 4 cr.

#755, 756. Chaucer
755: Troilus and Criseyde, in the context of medieval continental literature by Boccaccio and other influences. 756: The Canterbury Tales in its original language. Writing intensive. 4 cr.

758. Shakespeare
A few plays studied intensively. Live and filmed performances included as available. Writing intensive. 4 cr.

759. Milton
Milton and his age. Generous selection of Milton's prose and poetry, with secondary readings of his sources and contemporaries. Writing intensive. 4 cr. (Not offered every year.)

#763. Continental Backgrounds of the English Renaissance
Major philosophers, artists, and writers of the continental Renaissance (in translation): Petrarch, Ficino, Pico, Vives, Valla, Castiglione, Machiavelli, Luther, Calvin, Rabelais, Montaigne, Cervantes, Erasmus, and Thomas More, as representative of the early English Renaissance. Writing intensive. 4 cr. (Not offered every year.)

#764. Prose and Poetry of the Elizabethans
Shakespeare and his contemporaries. Major works, including Spenser's Faerie Queene, Sidney's Astrophel and Stella, and Shakespeare's Sonnets: their literary and intellectual backgrounds. Writing intensive. 4 cr. (Not offered every year.)

#765. English Literature in the 17th Century
Major writers of the 17th century, including Donne, Jonson, Herbert, Bacon, and Hobbes. Writing intensive. 4 cr. (Not offered every year.)

767. Literature of the Restoration and Early 18th Century
Poetry, drama, fiction, letters, journals, and essays from the period following the restoration of Charles II to the throne of England after the English Civil War. Works by such figures as John Dryden, Aphra Behn, Daniel Defoe, Jonathan Swift, Alexander Pope, and Lady Mary Wortley Montagu studied in the historical context. Examples from the colonial world and the continent (in translation) when appropriate. Writing intensive. 4 cr.

768. Literature of the Later Eighteenth Century
Poetry, drama, fiction, letters, journals, essays, and biography from the period that culminated in the American and French Revolutions. Works by such figures as Henry Fielding, Samuel Johnson, Frances Burney, Laurence Sterne, William Blake, and Mary Wollstonecraft studied in historical context. Examples from the colonial world and the continent (in translation) when appropriate. Writing intensive. 4 cr.

#769, 770. The English Romantic Period
Major literary trends and authors, 1798 to 1832. Focus on poetry but attention also to prose works and critical theories. 769: Wordsworth, Coleridge, Lamb, Hazlitt, DeQuincey; 770: Byron, Shelley, Keats. Writing intensive. 4 cr. (Not offered every year.)

771, 772. The English Victorian Period
The English Victorian Period-Fiction, nonfiction and poetry from 1832-1900. 771: Money, Science, and Love. 772: Art, Decadence, and Empire. Authors include the Brontës, Dickens, Hardy, Wilde, Tennyson. 771 is writing intensive. 4 cr. (Not offered every year.)

773, 774. British Literature of the 20th Century
Poets and novelists of the modernist and postmodernist periods. 773: W. B. Yeats, James Joyce, Virginia Woolf, E. M. Forster, D. H. Lawrence, and other modernists. 774: a selection of postmodernist or contemporary writers, such as William Golding, Doris Lessing, John Fowles, Philip Larkin, Seamus Heaney, Margaret Drabble, and others. Writing intensive. 4 cr.

#775. Irish Literature
Survey from the beginnings to present; works in Irish (read in translation) such as The Cattle Raid of Cooley, medieval lyrics, and Mad Sweeney; and works in English from Swift to the present. 20th-century authors: Joyce, Yeats, Synge, O'Casey, Beckett, and Flann O'Brien. 4 cr. (Not offered every year.)

778. Brain and Language
Introduction to neurolinguistics, a study of how language is related to the structure of the brain. Biological foundations of linguistic universals and language acquisition. Examination of evidence from aphasia and from normal language use. Writing intensive. 4 cr.

779. Linguistic Field Methods
Study of a non–Indo-European language by eliciting examples from an informant, rather than from written descriptions of the language. Students learn how to figure out the grammar of a language from raw data. Prereq: ENGL/LING 505. (Also offered as LING 779.) Special fee. 4 cr. (Not offered every year.)

780. English Drama to 1640
Development of the drama through the Renaissance, emphasizing the Elizabethan and Jacobean dramatists. Writing intensive. 4 cr.

#781. English Drama, 1660–1800
Study of selected plays, their performance and their publication. Works by such figures as William Wycherley, Thomas Otway, Mary Pix, George Lillo, Susanna Centlivre, Richard Sheridan, and Elizabeth Inchbald. Special attention to the new prominence of women in the drama of this period, changes in theatre architecture, forms of nondramatic spectacle, and the political and social significance of drama. Writing intensive. 4 cr.

782. Modern Drama
Major English, American, and (translated) European plays of the modern period by such playwrights as Shaw, Ibsen, Chekhov, Strindberg, Pirandello, O'Neill, Brecht, Beckett, Williams, Miller, Pinter. Live and filmed performances studied as available. Writing intensive. 4 cr. (Not offered every year.)

783. The English Novel of the 18th Century
Study of the rise and development of the novel in the eighteenth century. Works by such figures as Daniel Defoe, Eliza Haywood, Samuel Richardson, Henry Fielding, Charlotte Lennox, Laurence Sterne, Frances Burney, and Jane Austen. Focus on writers who published their work in England but with examples from the colonial world and the continent (in translation) when appropriate. Writing intensive. 4 cr.

784. The English Novel of the 19th Century
Representative novels from among Austen, Scott, Dickens, Thackeray, Emily Brontë, Charlotte Brontë, Trollope, George Eliot, Hardy, and Conrad. Writing intensive. 4 cr.

785. Major Women Writers
Intensive study of one or more women writers. Selections vary from year to year. Writing intensive. 4 cr.

786. Twentieth-Century British Fiction
Traces the development of the novel from the turn of the century to the present day. Representative novels by Lawrence, Joyce, Conrad, Woolf, West, Forester, Huxley, Waugh, Murdoch, Burgess, and Lessing. Writing intensive. 4 cr.

790. Special Topics in Linguistic Theory
Advanced course on a topic chosen by the instructor. Inquire at the English department office for a full course description each time the course is offered. Topics such as word formation, dialectology, linguistic theory and language acquisition, history of linguistics, language and culture, cross-disciplinary studies relating to linguistics. Barring duplication of subject, may be repeated for credit. (Also offered as LING 790.) Writing intensive. 4 cr.

791. English Grammar
Survey of the grammar of English (pronunciation, vocabulary, sentence structure, punctuation, dialect variation, historical change) with special attention to the distinction between descriptive and prescriptive grammar and to the problems students have with formal expository writing. Writing intensive. 4 cr.

792. Teaching Secondary School English
Methods of teaching language, composition, and literature in grades 7–12. Required of all students in the English teaching major. Open to others with permission. Writing intensive. 4 cr.

793. Phonetics and Phonology
The sound system of English and other languages as viewed from the standpoint of modern linguistic theory, including the following topics: the acoustic and articulatory properties of speech sounds, the phonemic repertoires of particular languages, phonological derivations, and prosodic phenomena such as stress and intonation. (Also offered as LING 793.) Prereq: a basic linguistics course or permission. 4 cr.

794. Syntax and Semantic Theory
Relationship of grammar and meaning as viewed from the standpoint of modern linguistic theory. Emphasis on the syntax and semantics of English, with special attention to the construction of arguments for or against particular analyses. (Also offered as LING 794.) Prereq: a basic linguistics course or permission. Writing intensive. 4 cr.

795. Independent Study
Open to highly qualified juniors and seniors. To be elected only with permission of the department chairperson and of the supervising faculty member or members. Barring duplication of subject, may be repeated for credit up to a maximum of 16 credits. Writing intensive. 1–16 cr.

797, 798. Special Studies in Literature
A) Old English Literature; B) Medieval Literature; C) 16th Century; D) 17th Century; E) 18th Century; F) English Romantic Period; G) Victorian Period; H)

20th Century; I) Drama; J) Novel; K) Poetry; L) Nonfiction; M) American Literature; N) A Literary Problem; O) Literature of the Renaissance. The precise topics and methods of each section vary. Barring duplication of subject, may be repeated for credit. For details, see the course descriptions available in the English department. Writing intensive. 2–6 cr.

Environmental and Resource Economics (EREC)

Department of Resource Economics and Development
(For program description, see page 85; see also course listings under Community Development.)

Chairperson: Alberto B. Manalo
Professors: John M. Halstead, Edmund F. Jansen, Jr., Bruce E. Lindsay
Associate Professors: Alberto B. Manalo, Douglas E. Morris
Extension Educator: Michael R. Sciabarrasi

411. Environmental and Resource Economics Perspectives
Microeconomic theory and analysis in resource management and use decisions. Survey of significant resource problems from an economic perspective and the application of economic analysis. Cannot be taken for credit after ECON 402 or equivalent. Special fee. 4 cr.

501. Agricultural and Natural Resource Product Marketing
Structure, organization, strategies and performance of the business sector in agriculture, forestry, and other local natural resource-based industries; commodity marketing systems; demand estimation, pricing policies, consumer characteristics, and related topics. Prereq: EREC 411 or equivalent;/or permission. 4 cr. (Offered every other semester.)

504. Business Management for Natural Resource Firms
Planning, operation, and control of natural resource-based firms with direct application to agriculture, aquaculture, forestry, and recreational businesses. Emphasis on decision making, problem solving, and operational strategies. Prereq: EREC 411 or equivalent. Lab. 4 cr.

506. Population, Food, and Resource Use in Developing Countries
Economic, technical, cultural, social, and political factors that influence food supplies, nutrition resource use, employment, and income distribution in the developing countries; the population explosion; strategies for expanding food supplies; social and institutional constraints, strategies and policies for economic development. Prereq: EREC 411 or equivalent. 4 cr.

512. Gulf of Maine Economic Resources
Topics include fisheries management, oil and gas recovery, and ocean minerals mining. Lab and fieldwork will include opportunity to observe and interview those professionally involved in harvesting marine resources in the Gulf of Maine. Offered as a one-week course at the Shoals Marine Laboratory. Prereq: Intro. econ. course or permission. 1 cr. (Summers only.)

525. Statistical Methods and Applications
Applications of elementary statistical concepts and methods including probability, descriptive techniques, statistical inference and bivariate and multivariate statistical analysis. Orientation is toward analysis and interpretation of data commonly encountered in social science disciplines. No credit for students who have completed ADM 430; BIOL 528; DS 420; HHS 540; MATH 644; PSYC 402; SOC 502. 4 cr.

595, 596. Problems in Natural and Agricultural Resources
Students pursue field, laboratory, or library problems in natural and environmental resources that are not covered by other courses. Faculty consultant and study topic must be chosen before registration. In consultation with the faculty adviser, students select the problem area, create a bibliography for reflection, and pursue the topic. A professionally written paper is expected at termination of the study. May be repeated once for credit. Prereq: permission. 2–4 cr.

600. Field Experience
A supervised experience providing the opportunity to apply academic experience in settings associated with future professional employment and/or related graduate opportunities. Must be approved by a faculty advisor selected by the student. May be repeated to a maximum of 8 credit hours. Prereq: permission. 1–4 cr. Cr/F.

604. Financial Concepts for Natural Resource Firms
Financial decision theory, risk management, investment analysis, financial statement analysis, and asset appraisal techniques with direct application to agricultural and natural resource firms. Prereq: EREC 504. Lab. 4 cr.

606. Land Use Economics
Economic and institutional factors affecting human use of land resources; historical discussion of land ownership patterns; supply and demand; production relationships; location and resource use; benefit-cost analysis; institutional restraints and planning for more efficient use of land. Real estate market and taxation. Prereq: EREC 411 or equivalent. 4 cr. (Offered every other semester.)

611. Marine Resource Economics
Economic overview of the marine environment; interactions/conflicts surrounding this multiple-use resource. Economics of fisheries; marine recreation; offshore facilities; aquaculture; waste disposal. Prereq: EREC 411 or ECON 402;/or permission. 4 cr. (Offered every other semester.)

627. Community Economics and Finance
Economic and financial factors affecting community and local government decisions. Emphasis on use of economic theory and analytical techniques to evaluate problems in contemporary New England communities and towns. Prereq: EREC 411 or ECON 402. (Also offered as CD 627.) 4 cr. (Offered every fourth semester.)

633. Economics of Travel and Tourism
Provides an understanding of both the microeconomic and macroeconomic aspects of travel and tourism. Using economics as a theory base, the course attempts to identify what is significant or special about travel and tourism compared with other activities. Special attention is given to issues such as resource immobility, capacity constraints, seasonality, and consumers' inability to experience the product before purchase. Prereq: EREC 411. (Also offered as TOUR 633.) 4 cr.

666. Empirical Resource Economics: Methods and Techniques
Integrates the theoretical, experimental, mathematical, and statistical components of resource economics analysis. Includes problem identification, data collection techniques, data management, mathematical and statistical models, and report generation. Methods and techniques discussed in lecture are demonstrated using personal computers. Addresses assumptions required by the models and techniques and their relationship to the theory and analytical results. Prereq: EREC 411; MATH 420; CS 401 (or 495); junior standing and permission. 4 cr.

676. Economics of Water Use and Quality Management
Economics of water use; role of government and policy agencies, water supply and demand, economic impact of water and water quality standards, alternatives in quality management, externalities, and methods of evaluation. Prereq: elementary biological or physical science (or WARM 504); EREC 411. 4 cr. (Offered every third semester.)

704. Economics of Policy Issues in Food and Natural Resource Use
Economic analysis of current issues affecting food and natural resource use, such as food, safety, air and water pollution, land use and conservation, and waste management. Economic, political, and social consequences of alternative policies and programs are evaluated. Prereq: at least one EREC 600-level course or permission. Writing intensive. 4 cr. (Not offered every year.)

708. Environmental Economics
Environmental pollution, the market economy, and optimal resource allocation; alternative control procedures; levels of environmental protection and public policy; property right issues. Prereq: Intermed. microecon. theory; permission. Writing intensive. 4 cr. (Offered every third semester.)

710. Environmental and Resource Economics Seminar
Seminars arranged to students' needs and offered as demand warrants: A) Rural Development; B) Marine Economics; C) Community Economics; D) Land and Water Economics; E) Quantitative Methods; F) Recreation Economics; G) Small Business Economic and Managerial Issues. In-depth treatment of area, including classic works. May be repeated. 2–4 cr.

715. Linear Programming and Quantitative Models
Solving applied economic problems using linear and nonlinear techniques with emphasis on problem specification and interpretation of model results. Unit of analysis includes individuals, firms, or communities as they address contemporary problems dealing with resource allocation, product distribution, and whole-firm organization. Computer applications on both mainframe and personal computers utilized for managerial decision making. Project required. Prereq: permission. Writing intensive. 4 cr. (Offered every other year.)

756. Rural and Regional Economic Development
Concepts and methods of delineating regional economies, methods of measuring activity, re-

gional development, and public policies. Emphasis on empirical research studies. Prereq: intermed. econ. theory or permission. Writing intensive. 4 cr. (Offered every third semester.)

795. Investigations in Environmental and Resource Economics
Special assignments in readings, investigations, or field problems. Topics may include agricultural marketing, agricultural production and farm management, community development, economics of human resources, economics of population and food, land economics, marine economics, rural economic development, regional economics, water economics, or teaching experience. Prereq: permission. May be repeated. Variable 2–4 cr.

799. Senior Thesis/Honors
Students develop and conduct individual research projects related to applied resource economics under the direction of a senior thesis committee. The resulting written thesis is defended in an oral presentation before departmental faculty and students. Prereq: permission, majors only, senior standing. 4 cr.

Environmental Conservation (EC)

Department of Natural Resources
(For program description, see page 86; for faculty listing, see page 191; see also course listings under Forestry, Natural Resources, Soil Science, Water Resources Management, and Wildlife Management.)

#503. Wetlands Resources
Examination of coastal and adjacent freshwater and estuarine wetlands from historical, destruction, and preservation perspectives. Field trips and laboratory sessions emphasize succession and investigation of dominant plant, insect, and vertebrate associations. Daily and evening lectures, labs, and fieldwork. Prereq: one full year of college-level biology. 2 cr. (Offered summers at the Shoals Marine Laboratory.)

535. Contemporary Conservation Issues and Environmental Awareness
How human technology causes biological and social conflicts when applied to the ecosystem; multiple demands of game, timber, water, minerals, and soil ecosystems vs. economic growth. Lab. 4 cr.

582. Economic Geography
Investigation of the manner in which resources and space have been organized for the production of goods and services: agriculture, the extractive industries, manufacturing, and the tertiary sector. Empirical studies, theories of location, and location models. Major contemporary problems and issues in agriculture and food supply, energy sources, industrial readjustment, and the global economy. Also offered as GEOG 582. 4 cr. (Not offered every year.)

595. Problems in Natural and Environmental Resources
Field, laboratory, or library problems in natural and environmental resources that are not covered by other courses. A faculty consultant and study topic must be chosen before registering. In consultation with the faculty adviser, students select the problem area, create a bibliography, and find channels to pursue the topic. Final paper. May be repeated once for credit. Prereq: permission. 2–4 cr.

601. Environmental Conservation and Sustainable Living Internship
Practical internship and field experience in a location removed from the University milieu to give the environmental conservation student a dimension and insight into sustainable resource management systems not available in the campus experience. Prereq: permission. 4 cr. Cr/F.

#610. Coastal and Oceanic Law and Policy
Intended for students interested in careers in marine or coastal resources management, or in the natural sciences. Includes law and policy related to ocean dumping, marine sanctuaries, environmental impact statements, water and air pollution, fisheries management, offshore gas and oil production, and territorial jurisdiction. Lectures on the status and history of laws are accompanied by discussions of relevant policy and the efficacy of various legal techniques. A case study, requiring extensive use of the laboratory's library and personnel, is assigned. 2 cr. (Offered summers at the Shoals Marine Laboratory.)

637. Practicum in Environmental Conservation
Independent participation in an environmental conservation activity in the area of the student's specialization. Individual or group projects may be developed under the supervision of any faculty member within or outside natural resources or with supervisors in public and private agencies, upon approval of the course instructor. Research projects not acceptable. Prereq: senior standing in the environmental conservation program. Lab. 4 cr. Cr/F.

660. Evolution, Biodiversity and Community Ecology in Geographically Isolated New Zealand
From a bioregional perspective, investigation of the geographical, geological, biological, and human ecological processes that have shaped the distribution of species and biotic communities in present day New Zealand. The biogeography and evolutionary history, including the impacts of human settlement of these unique islands will serve as a basis for field studies designed to develop students' conceptual knowledge and field skills (classification, mapping, habitat assessment, field identification, sampling) as they study community ecology of representatative ecosystems and land/sea regimes and the effects of human influences on these systems. Integrated modules of lectures and field exercises. Prereq: permission, junior standing. Coreq: EC 661, 662, 663. Special fee. 5 cr. Cr/F.

661. Ecosystem Management and Restoration Ecology in New Zealand
Focus on ecological opportunities and constraints to be considered to ensure sustainable use of natural resources in Hauraki Gulf and the Hauraki/Coromandel/Huna catchment basin. Student investigations will compare resource planning and management in this ecosystem with those of native forests and the sub-alpine and West Coast ecosystems of South Island. Impacts of resource management on natural and human communities, conflicts among user groups and approaches for their resolution will be examined for forests, agricultural lands, near-shore marine areas, costal zone and special wildlife management areas. Representatives of all key resource management agencies and interest groups will be engaged in the course. Development of field resource assessment skills and learning to set yield levels for specific resources. Prereq: permission, junior standing. Coreq: EC 660, 662, 663. Special fee. 4 cr. Cr/F.

662. Environmental Policy, Planning and Economics in New Zealand's Political Context
Assesses the impacts of the N.Z. Resource Management Act of 1991 on the ecology, economy, and socio-political environment in New Zealand with emphasis on examination of historical exploitation of N.Z. resources, indigenous use issues and conflicts, and options for attaining a more sustainable equilibrium between people and nature. Exposure to diverse perspectives of Maori, businesses, the N.Z. Department of Conservation, and Metropolitan Regional Councils regarding custodianship of the natural heritage and the relative acceptability of proposed conflict resolutions. Examination of cases involving the Resource Consents Processes at district, regional, and national levels and will evaluate various N.Z. institutions for their effectiveness in dealing with resource management issues. Prereq: permission, junior standing. Coreq: EC 660, 661, 663. Special fee. 3 cr. Cr/F.

663. Applied Directed Research on Sustainable Resource Use in the Hauraki Basin, New Zealand
Working closely with faculty mentors, students will use the scientific method to develop and test hypotheses regarding selected resource issues in the Hauraki Basin. Experimental design, standardized data collection methods, and basic statistical and policy analytic methods will be used to investigate and develop a report on a resource issue of concern. Data analysis and communication (including writing) skill development will be stressed. Presentation of findings at a scientific meeting which includes resource management and research collaborators, community groups and clients, including government agencies. Prereq: permission, junior standing. Coreq: EC 660, 661, 662. Special fee. 4 cr. Cr/F.

671. North American Geocommons Studies in Sustainable Community Design
Provides a unique opportunity to combine academic and field studies with the learning of ecological design skills through participation in two or three small communities working towards sustainability. Students will learn to recognize and analyze the physical, social, economic, political, ethical and spiritual elements that make up sustainable communities. Governance policies will be examined relative to local ecosystem elements. Prereq: BIOL 541, permission. Coreq: EC 672, 673. Special fee. Lab. 4 cr.

672. North American Geocommons Problems in Human Relationships to Their Local Environment
Exploration of the relationships between people and their local environment. What factors determine the degree of care that people have for their places? Students will study the role of human history, language, education, physical landscape, society, and worldview on shaping human-place relations. They will try out ways of strengthening these connections through use of ecological footprint analysis, community-based social marketing, mindful awareness, and systems thinking. Prereq: BIOL 541, permission. Coreq: EC 671, 673. Special fee. Lab. 4 cr.

673. North American Internship in Sustainable Development
A field-based experience combined with readings, dialog, reflection, and a project paper introduces the student to the history, methods, and meanings of sustainable development. Emphasis is on the development of students' field skills. Students select, implement, and evaluate an internship project in sustainable development. Prereq: BIOL 541, permission. Coreq: EC 671, 672. Special fee. 4 cr. Cr/F.

674. International Geocommons Studies in Sustainable Community Design
Provides a unique opportunity to combine academic and field studies with the learning of ecological design skills through participation in two or three small communities working towards sustainability. Students will learn to recognize and analyze the physical, social, economic, political, ethical, and spiritual elements that make up sustainable communities. Governance policies will be examined relative to local ecosystem elements. Prereq: BIOL 541, permission. Coreq: EC 675, 676. Special fee. Lab. 4 cr.

675. International Geocommon Problems in Human Relationships to Their Local Environment
Exploration of the relationships between people and their local environment. What factors determine the degree of care that people have for their places? Students will study the role of human history, language, education, physical landscape, society, and worldview on shaping human-place relations. They will try out ways of strengthening these connections through use of ecological footprint analysis, community-based social marketing, mindful awareness, and systems thinking. Prereq: BIOL 541, permission. Coreq: EC 674, 676. Special fee. Lab. 4 cr.

676. International Geocommon Internship in Sustainable Development
A field-based experience combined with readings, dialog, reflection, and a project paper introduces the student to the history, methods, and meanings of sustainable development. Emphasis is on the development of students' field skills. Students select, implement, and evaluate an internship project in sustainable development. Prereq: BIOL 541, permission. Coreq: EC 674, 675. Special fee. 4 cr. Cr/F.

687. Internship in Sustainable Living
Residential field experience in building a sustainable community at a location removed from the University context. Experiential learning combined with time for dialog, reading, and reflection offers a unique learning opportunity. Prereq: permission. Special fee. 4 cr.

688. Geography of Population and Development
A regional approach to the study of population geography with concern for the interaction between the focus of economic growth and components of population change and development. Considers the environmental impact of development trends in the developed and developing worlds and the relationship of these trends to sustainable growth and population patterns. (Also offered as GEOG 685.) 4 cr.

690. Sustainability Analysis: Focus on Purchasing
Theory and practice of sustainability: a hands-on course that introduces students to sustainability concepts through investigation of purchasing practices at UNH. Teaches skills in product investigation, censusing, and numerical analysis of both environmental and product costs. Working in groups, students survey and research products for sustainability impact; identify alternative products; prioritize choices based on environmental costs; and make recommendations that do not impact cost or performance. 3 cr.

695. Special Topics in Environmental Conservation
Topics may include environmental and natural resource policy; environmental diplomacy; the application of ethics, values, and philosophy to environmental conservation; agriculture; or teaching experience in these and related areas. Seminar format. Prereq: permission. Special fee for some topics. 1–4 cr. Cr/F.

702. Ecological Values and Ethics
Deeper more fundamental philosophical questions, including spiritual values questions, are being asked concerning the ecological/environmental challenge of our time; its causes and resolution. Aspects of this challenge—environmental education, energy, food, agriculture, and natural resources—analyzed with ethics and values approaches. Students develop ways of responding to problem identification and resolution. Prereq: permission. 4 cr.

703. Applied Environmental Philosophy
Applying the philosophical theory underlying environmental studies and approaches to environmental conservation. Students conduct critiques of extensive readings and write papers creatively analyzing aspects of selected philosophical works. Major research manuscript required. Lab. 4 cr.

718. Law of Natural Resources and Environment
For resource managers: the legal system pertaining to resource management, protection of the environment, and possibilities for future action. Prereq: EC 535, EREC 606, or equivalent. 3 cr.

720. International Environmental Politics and Policies for the 21st Century
Examines policies for managing human activities to sustain the health of regional ecosystems and planetary life-support systems. Focus on selected problems of the international commons (e.g., oceans, marine resources, atmosphere, migratory species); global and regional carrying capacity (e.g., population, resource consumption), internationally shared ecosystems (e.g., transboundary watersheds and waterbodies, tropical forests); and the relevant international institutions and politics for policy formation, conflict resolution and implementation. Using a policy analytic framework, students develop case studies to assess international policies and institutional arrangements to achieve the objectives of Agenda 21-The Earth Summit Strategy to Save the Planet. Prereq: permission. 4 cr.

724. Resolving Environmental Conflicts
Theories and practices of environmental dispute settlement. Roles of public, nongovernmental organizations and government assessed. Effectiveness of public participation initiatives in influencing public policy decisions and/or resolving environmental conflicts examined. Alternative approaches to consensus (policy dialogues, joint problem solving; strategic planning; negotiation/mediation) as well as litigation examined. Specific cases critiqued and evaluated; conflict resolution skills developed. Prereq: second-semester juniors, seniors; permission. 3 cr.

725. Environmental Communications and Advocacy
Principles and techniques of communication and policy advocacy as applied to selected environmental issues. Case studies of regional, national, international importance are pursued within a seminar-workshop format in which students: (1) learn content analysis skills to critically examine practical constraints on communication about environmental issues within complex political environments and involving stakeholders with diverse values and political interests; (2) develop analytical procedures and rhetorical strategies to build public policy advocacy cases, using diverse perspectives, for selected environmental issues; and (3) learn consensus building and negotiation strategies for forging advocacy coalitions and to advocate policy objectives in pluralistic contexts. Prereq: senior standing and permission. (Also offered as CMN 703.) 4 cr.

784. Sustainable Living
Concepts of living within ecosystem limits explored in a learning-community format. The importance of human communication, sense of place and time, and the health and longevity of our human species and natural systems emphasized. Examination of governance, education, economic, agricultural, and ethical systems while asking, "What makes one system more or less sustainable than another?" to lead to directions for sustainable society. Two field trips and small research projects conducted. Prereq: permission. Special fee. 2 cr.

785. Systems Thinking for Sustainable Living
Introduction to systems thinking from a sustainable living perspective. The course is a collaborative inquiry using a problem-solving approach. After studying different types of systems and learning a variety of tools useful in systems analysis, we ask, "In what ways can systems thinking be employed to understand and begin to resolve the complex problems that face us as we move toward living within limits of natural systems?" Prereq: EC 784 or permission. 3 cr.

795. Investigations in Environmental Conservation
Seminar and independent study format. An opportunity to identify and explore specific research issues. Topics may include policy, principles of sustainable living, leadership and advocacy, legislative and judiciary processes, public agencies, or issues relating to environmental science. Seminar format. Prereq: permission of instructor. 1–4 cr.

799. Senior Thesis and Seminar
Writing and completion of a senior thesis synthesizing the environmental conservation undergraduate experience, supported by a weekly seminar with all thesis writers. Prereq: majors only, senior standing. 4 cr. Cr/F.

Environmental Engineering: Civil Engineering (ENCV)

(For program description, see page 61.)

Professors: M. Robin Collins, Nancy E. Kinner
Associate Professors: Thomas P. Ballestero, James P. Malley, Jr.
Research Associate Professor: T. Taylor Eighmy
Research Assistant Professor: Larry K. Brannaka

400. Environmental Engineering Lectures
Introduction to the profession, the environmental engineer as planner, designer, problem solver and interdisciplinary team player; and the goals of the environmental engineering curriculum within the civil engineering track. Introduction to concepts of integrated design. Lectures by faculty and practitioners. Field trips to environmental engineering projects. Introduction to computer skills required for environmental engineering. Engineering ethics. 1 cr. Cr/F.

520. Environmental Pollution and Protection-A Global Context
Introduction to environmental science and engineering and the anthropogenic causes of environmental change. Emphasis on the causes, effects, and controls of air, water, and land pollution. The political, ecological, economic, ethical, and engineering aspects of environmental pollution and control are discussed. Field trips: Each student will attend 4 per semester. Writing intensive. 4 cr.

556. Environmental Engineering Microbiology
Concepts of environmental engineering microbiology. Topics include taxonomy of species important in environmental engineering processes; cellular chemical composition and ultrastructure of microorganisms in environmental engineering processes; microbial metabolism, interaction, and growth kinetics in environmental treatment processes; biogeochemical cycling in water; and effects of environmental parameters on environmental engineering microbial processes. Prereq: ENCV 520 or permission. Special fee. Lab. Writing intensive. 4 cr.

643. Environmental Sampling and Analysis
Theory of analytical and sampling techniques used in environmental engineering. Topics include potentiometry, spectroscopy, chromatography, automated analysis, quality control, sampling design, and collection methods. Methods discussed in lecture are demonstrated in labs. Prereq: CHEM 404; ENCV 520; or permission. Special fee. Lab. Writing intensive. 4 cr.

645. Fundamental Aspects of Environmental Engineering
Application of fundamental concepts of mass balance in treatment processes. Physical, chemical, and biological aspects of pollution control, and design concepts for operations and processes used in environmental engineering are discussed. Concepts of engineering ethics are presented. Prereq: CHEM 404; MATH 426; ENCV 520; or permission. Writing intensive. 4 cr.

695. Environmental Engineering Projects
Independent research, under faculty guidance, of a subject of particular interest to an individual or a small group. Prereq: permission of ENCV faculty member involved. 2–4 cr.

696. Environmental Engineering Field Experience
Based on appropriate career-oriented work experience in environmental engineering. Student can get one credit for field experience. A written final report is required as well as permission of student's adviser. 1 cr.

697. Environmental Engineering Internship
Off-campus work in the environmental engineering field for on-the-job skill development. Needs to be supervised by an environmental engineering faculty member and a proposal for the internship must be submitted and have permission of the ENCV faculty prior to the start of the internship. Prereq: permission. 2 cr. 1A.

739. Industrial Wastewater Treatment
Engineering consideration of the origin, characteristics, and treatment of industrial wastewater; the theory and application of unit operations unique to the treatment and disposal of industrial wastes. Prereq: ENCV 645 or permission. 3 cr.

740. Public Health Engineering
Proper application of environmental engineering and sanitation principles in disease prevention and control is discussed. Special emphasis will be given to areas of the world where communicable and related diseases have not yet been brought under control, and to what can happen in the more advanced countries when basic sanitary safeguards are relaxed. Topics covered: vector-borne diseases and control, sanitary landfills, safe water supply development and treatment, and on-site wastewater disposal systems. Prereq: MATH 425, ENCV 520. 3 cr.

742. Soil and Hazardous Waste Engineering
A thorough examination of the problems which exist in hazardous and solid waste management will be presented in terms of the current regulations and engineering approaches used to develop solutions. Topics will include risk-based decision making, transport and fate of contaminants, and the fundamental physical, chemical, and biological concepts which make up the basis for technological solutions to these waste management problems. Case studies will be used throughout the course to highlight key concepts and provide real-world examples. Prereq: ENCV 520 or permission. Writing intensive. 3 cr.

744. Physicochemical Treatment Design
Selection, design, and evaluation of advanced unit processes employed in physicochemical treatment of waters, wastewaters, and hazardous wastes. Discusses preparation of alternative designs and economic analysis. Emphasizes treatment schemes based on experimental laboratory or pilot studies. Prereq: ENCV 645 or permission. Special fee. Lab. 4 cr.

746. Bioenvironmental Engineering Design
Selection, design, and evaluation of unit processes employed in biological treatment of waters, wastewaters, and hazardous wastes. Preparation of engineering reports, including developing design alternatives and economic analysis, is required. Prereq: ENCV 645, CIE 642; or permission. Writing intensive. 4 cr.

747. Introduction to Marine Pollution and Control
Introduction to the sources, effects, and control of pollutants in the marine environment. Dynamic and kinetic modeling; ocean disposal of on-shore wastes, shipboard wastes, solid wastes, dredge spoils, and radioactive wastes; and oil spills. Prereq: ENCV 645 or permission. 3 cr.

748. Solid and Hazardous Waste Design
Selection, design, and evaluation of unit processes employed in the treatment of solid wastes and hazardous wastes will be studied. Topics include design of materials recovery facilities, landfills, waste-to-energy facilities and hazardous waste site remedial technologies. A group term project taken from a real-world project will be required. An oral presentation by the group and preparation of a final written engineering report including alternative evaluation, permits, scheduling and economic analysis will be required from each group. Prereq: ENCV 742 or permission. 4 cr.

749. Water Chemistry
Emphasizes the use of chemical equilibrium principles and theory, calculations, and applications of ionic equilibrium stresses. Topics include thermodynamics, kinetics, acid/base, complexation, precipitation/dissolution, and redox equilibria. Computer equilibrium modeling will be presented. Prereq: CHEM 404 or CHEM 405. 4 cr.

753. Marine Pollution at Shoals Marine Laboratory
Effects of pollutants in the marine environment discussed from the perspectives of elementary physical and chemical oceanography and biological processes. Covers sources and effects of marine pollutants; oil spill impact and clean-up procedures; ocean outfall disposal; shipboard wastewater treatment; marine disposal of sludge, solid waste, and dredge spoils; and radioactive waste disposal. Hands-on lab exercises test both low-level pristine marine water and high-level saline wastewater for chemical and microbial parameters. Conduct dye current studies. Class participates in the continuing assessment of the environmental impact of the Shoals Marine Laboratory domestic sewage system. Field trips to Seabrook nuclear power plant and state of N.H. oil pollution control unit. Daily and evening lectures, labs, and fieldwork. Prereq: ZOOL 674 or permission. (Not offered for credit if civil or environmental engineering major.) 4 cr.

788. Project Planning and Design
Student groups will be formed into multidisciplinary design teams to prepare a design plan for a large-scale environmental engineering system including consideration of budgetary constraints, regulatory requirements, and environmental impacts. Each team prepares a final written report and gives a formal presentation. Prereq: senior ENCV major or permission. Writing intensive. 4 cr.

795-796. Independent Study
A limited number of qualified seniors will be permitted to pursue independent studies under ENCV faculty guidance. Seniors may write terminal theses reporting the results of their investigations. May be repeated. Prereq: permission of ENCV faculty member involved. 1–4 cr.

Family Studies (FS)

(For program description, see page 68.)

Chairperson: Larry J. Hansen
Associate Professors: Kristine M. Baber, Elizabeth M. Dolan, Barbara R. Frankel, Larry J. Hansen, Michael F. Kalinowski, Victor R. Messier, Thomas M. Reischl
Assistant Professors: Kerry Kazura, MaryJane Moran

525. Human Development
Developmental information from conception through death; theoretical perspectives and research methods in human development; emphasis on student's communication and analytical skills. 4 cr.

545. Family Relations
Theories and research relating to the family and its role in individual development. 4 cr.

553. Personal and Family Finance
Applied financial management; allocation of income to maximize wealth. Topics include banking, investments, credit, insurance. 4 cr.

#555. Management and Decision Making
Theories of management, information processing, and decision making in the allocation of resources. 4 cr.

623. Developmental Perspectives on Infancy and Early Childhood
Integrative view of the developing child from conception through childhood within the family context. Prereq: FS 525. 4 cr. (Fall semester only.)

624. Developmental Perspectives on Adolescence and Early Adulthood
Developmental information from pubescence through early adulthood; the concept of identity and influences on identity formation. 4 cr.

635. Teaching/Learning in Social Constructivist Classrooms
Current theoretical approaches to communicating with children and influencing their behavior. Weekly four-hour laboratory experience working with preschool children is required at UNH Child and Family Center. Weekly three-hour seminar. Prereq: FS 525, FS 623; permission. 4 cr.

641. Parenting Across the Life Span
Examination of parent-child relations across a range of developmental time periods and situations. Explores issues affecting parent-child relationships. Prereq: FS 525, 545, permission. 4 cr.

653. Family Economics
Exploration of family economics and well being; public policy and family structure influences on the economic well being of families. Prereq: FS 545; one course in economics; permission. 4 cr.

695. Independent Study
Scholarly project in the area of child, family, and consumer studies. Regular conferences with supervising faculty required. Prereq: approval of departmental faculty. 1–6 cr.

697. Special Topics
Focused examination of a particular theoretical, methodological, or policy issue. May be repeated. Prereq: permission. Writing intensive. 4 cr.

707. Practicum
Supervised in-depth experience in teaching, research, or advocacy in a professional setting to increase the student's understanding of children, families, or consumer issues. A) Child; B) Family; C) Consumer Studies. Prereq: FS major; permission. 1–6 cr. Cr/F.

708. Child and Family Center Internship
Supervised position within the UNH Child and Family Center nursery school programs: A) Videotape assistant; B) Assessment assistant; C) Toddler program assistant; D) Assistant for three- to five-year-olds. May be repeated up to a total of 8 credits. Prereq: FS 635; permission. 1–8 cr. Cr/F.

709. Child Study and Development Center Internship
Supervised positions within the UNH Child Study and Development Center child care programs: A) Videotape assistant; B) Assessment assistant; C) Infant assistant; D) Toddler assistant; E) Assistant for three- to five-year-olds; F) Kindergarten assistant; G) Health issues assistant. May be repeated up to a total of 8 credits. Prereq: FS 525; 623; 635;/or permission. 1–8 cr. Cr/F.

710. Community Internship
Supervised position in community early childhood settings. A) Infant-toddler assistant; B) Preschool-child care assistant; C) Kindergarten assistant. May be repeated up to a total of 8 credits. Prereq: permission. 1–6 cr. Cr/F.

733. Supervising Programs for Young Children
Philosophical bases and theoretical rationales of various programs for young children; program alternatives and resources; issues in administration including supervision, finances, and regulations. Prereq: permission. 4 cr. (Fall semester only.)

734. Curriculum for Young Children
Designing and implementing developmentally appropriate activities for young children; assessing the effectiveness of activities; evaluating materials and equipment. Prereq: FS 525; 623; 635; permission. 4 cr. (Spring semester only.)

743. Families, Schools, and Community
Designed to emphasize the critical value of effective family- school-community partnerships in enhancing the education of young children. The literature assessing the interactive nature of the parent and school resources with cultural influences is examined. Current models of family-school-community partnerships are explored. Students will participate in parent/school/community activities within early childhood education centers and schools. Prereq: permission. Writing intensive. 4 cr.

746. Human Sexuality
Investigation of physiological, psychological, and sociological aspects of human sexuality. Particular attention to various social practices, policies, and programs that affect sexual attitudes and behaviors. Prereq: permission. 4 cr.

757. Race, Class, Gender, and Families
This seminar explores the intersection of race, class, and gender in family life in the United States. Theory, research, and other relevant literature used to examine the variety of family configurations in our society today and the diverse experiences that families have as a result of existing social, political, and economic institutions. The strengths of various family types are considered, as well as the particular challenges these families may encounter in contemporary society. Prereq: seniors or graduate students only; permission. 4 cr.

760. Family Programs and Policies
Analyzes the connection between family support programs and family policy. Stresses program planning, implementation, and evaluation. Examines the research, theory, history, and current status of model family programs. Prereq: FS 545; permission. 4 cr.

771. Observation and Assessment of Young Children
Comprehensive view of various observation techniques for determining children's strengths and emerging skills. Exploration of issues regarding the use of formal assessments and testing with young children, retention and transitional placements, and the parent's role in testing. Prereq: FS 525; 623; 635. 4 cr. (Fall semester only.)

772. International Approaches to Child Advocacy
An investigation into the rationales for advocacy, types of advocacy, advocacy techniques and strategies, and current domestic and international advocacy issues and approaches. Prereq: seniors only; permission. 4 cr.

773. International Perspectives on Children and Families
An investigation of historical and modern conceptions of children and families in selected African, Asian, European and Latin countries. Emphasis will be placed on the contribution of these populations to the changing ethnic portrait of America. Prereq: seniors only; permission. 4 cr.

782. Family Internship
Supervised experience working in social, legal, and marketplace settings that offer services to families. Students spend a minimum of 15 hours per week in a selected community program. Admission by application only. Applications due prior to registration spring semester of the junior year. A senior-level course with 6 credits being taken each semester. Prereq: FS major; senior status; FS 525; 545; 20 credit hours of family studies course work; permission. Coreq: FS 792, 760. 12 cr. Cr/F. IA.

785-786. Seminar for Student Teachers
These seminars supplement the student teaching experience and effect a transition to the profession of teaching for those students admitted to the early childhood certification option. 2 cr.

788. Student Teaching of Young Children
Supervised teaching experience. Students spend a minimum of 20 hours per week in a selected program for young children working with a cooperating teacher. Students must apply during the spring semester of their junior year. Prereq: FS major; FS 525; 545; 623; 635; 733; 734; 743; EDUC 706; KIN 675; MATH 621; THDA 520; permission. Coreq: FS 785-786. 8 cr. Cr/F. (Spring semester only.)

792. Family Internship Seminar
This biweekly seminar focuses on issues of concern to family internship students, provides advanced training in educational strategies for working with families, and develops students' professional skills. This is a two-semester course with 2 credits being taken each semester. Prereq: FS major; admission to family internship program; permission. Coreq: FS 782. 4 cr. (Fall and spring semester.) IA.

794. Families and the Law
Exploration of laws affecting families and the interaction of family members with each other and with society. Prereq: FS 545; permission of instructor. 4 cr.

797. Advanced Special Topics
Highly focused examination of a particular theoretical, methodological, or policy issue. Prereq: permission. Writing intensive. 4 cr.

799. Honors Senior Thesis
Under direction of a faculty sponsor, students plan and carry out an independent investigative effort in an area of family, child, and/or consumer studies, resulting in a written thesis and an oral presentation before students and faculty. Prereq: majors only; senior standing; permission. Two-semester sequence as continuing course. 2–4 cr.

Forestry (FOR)

Department of Natural Resources
(For program description, see page 87; see also course listings under Environmental Conservation, Natural Resources, Soil Science, Water Resources Management, and Wildlife Management. For a listing of the faculty, see under Natural Resources.)

423. Dendrology
North American forest trees; taxonomy, silvical characteristics, community relationships; major forest regions. Restricted to NR majors; others by permission. Coreq: FOR 425. 2 cr.

425. Field Identification of Trees and Shrubs
Identification and nomenclature of important North American trees; emphasis on trees and associated woody species of the Northeast. Restricted to NR majors; others by permission. Coreq: 423. Special fee. Lab. 2 cr.

426. Wood Science and Technology
Wood microstructure and identification: physical, chemical, and mechanical properties; characteristics of wood including those produced by growth and form (i.e., knots, cross-grain) and those produced by degradation (i.e., stain, decay); log and lumber processing and quality evaluation; preparation of wood for use, including drying, gluing, and protection against degradation. Special fee. Lab. 4 cr.

500. Work Experience
Work in forestry or closely related field; must be performed under professional supervision or approved by natural resources faculty. Students are responsible for arranging their own experience. (Forestry majors only.) May be repeated. 0 cr. Cr/F.

#501. Working with Forests
Integrated study of scientific, technical, administrative, and social elements of forest resource management. Emphasis on tree identification, measurement, and protection techniques. Of interest to students in unrelated as well as related fields. Not open to forestry majors. Special fee. Lab. 4 cr.

502. The Endangered Forests
Discussion of the two major international problems in forestry: dying of forests due to air pollution in developed countries; and loss of forests due to clearing and heavy cutting in tropical countries. The value of forests and their importance to people. Guest speakers and field trip. Special fee. Lab. 4 cr.

506. Forest Entomology
Especially for forest majors. Structure, development, classification, and control of representative forest insects. Insect collection required. Special fee. Lab. Writing intensive. 4 cr.

527. Forest Ecology
Application of general ecological principles to the study of forests worldwide; examination of the forest from the level of the individual tree to the forest community; consideration of the impact of forest management on ecosystem structure and function. Prereq: PBIO 412 or BIOL 411; FOR 423 and FOR 425. (Open only to EC, FOR, PBIO, SOIL, WARM, and WILD majors.) Special fee. Lab. 4 cr.

542. Forestland Measurement and Mapping
Elementary measuring equipment and techniques; preparation of maps; public land survey; courthouse deed search. Two-week field session following spring semester. (FOR, WARM, and WILD majors only.) Special fee. 2 cr.

544. Forest Biometrics
Sampling techniques basic to forest inventory, regression estimation used in deriving volume equations and predicting forest growth and yield. Field labs include plot and point sampling. Analyses made using microcomputers. Special fee. Lab. 3 cr.

#581. Methods in Land Surveying
Principles and field methods of land surveying for the natural resource manager; measurement of distance, direction, and elevation; instrumentation and computation; legal aspects of land description and boundary. Prereq: FOR 542 or permission. Lab. 4 cr. (Not offered every year.)

629. Silviculture
Application of ecological knowledge to the control, establishment, composition, and growth of forest stands for economic purposes. Prereq: FOR 423 and 527. Special fee. Lab. 3 cr.

630. Forest Harvesting and Silviculture
Harvesting and silvicultural practices. Prereq: FOR 629 or permission. Limited enrollment. 2 cr. Cr/F. (Not offered every year.)

643. Economics of Forestry
Intermediate-level analyses of supply and demand for forest-based goods and services, managerial economics, taxation, capital investments. Prereq: EREC 411 or ECON 402. 4 cr.

652. Forest Resources Assessment
Aerial photo type mapping and forest resources inventory: type identification and delineation, map construction, cruise design, and forest resources inventory. Two-week field session following spring semester. (Natural resources majors, others by permission.) Prereq: FOR 527 and 544 Special fee. 2 cr.

660. Forest Fire Protection
Forest fire prevention, behavior, and effective control; weather phenomena; other aspects of forest damage; fire effects and use. Prereq: FOR 527 or 629; SOIL 501. Special fee. Lab. 2 cr.

695. Investigations in Forestry
Topics may include forest ecology, remote sensing, wood products, mensuration, forest economics, forest management, decision science, watershed management, natural resource education, or teaching experience. Prereq: permission. 1–4 cr.

722. Advanced Silviculture
Intensive silviculture of forest stands. Regeneration (e.g., alternative regeneration methods and site preparation); stand management (e.g., thinning schedules and fertilization). Prereq: FOR 629 or equivalent; permission. Special fee. 3 cr. (Not offered every year.)

725. Ecology and Management of Tropical Forests
Investigations of tropical environments; structure, composition, and evolution of tropical forests; examination of the archeological record of human impacts on tropical forests; tropical deforestation; tropical soils and agroforestry systems. Analysis of tropical timber and nontimber forest products. Prereq: FOR 527 or equivalent; EREC 411 or equivalent. 4 cr.

734. Forest Protection Seminar
Discussion and special problems based on principles and techniques of forest protection. Prereq: permission. 3 cr. (Not offered every year.)

745. Forest Management
Forest land ownership; management objectives; forest inventory regulation and policy; forest administration; professional responsibilities and opportunities. Prereq: completion of junior year in forestry curriculum. Special fee. Lab. 4 cr.

754. Wood Products Manufacture and Marketing
Wood products from harvesting and procurement of raw material to finished product processes, management decisions, marketing, and promotion problems. Case-study approach backed up by weekly all-day field trips to wood products manufacturing plants in the region. Prereq: FOR 426 or permission. Special fee. Lab. 4 cr.

755. Regional Silviculture and Forest Management
Extended field trip to another forest region. Prereq: senior standing; FOR 745;/or permission. Limited enrollment. 2 cr. Cr/F. (Not offered every year.)

799. Honors Senior Thesis
Students design and conduct individual research projects under the direction of an honors thesis committee. The research should address a real issue in forestry related to students' interests. The resulting written thesis is defended in an oral presentation to committee members. Restricted to seniors seeking honors in major. Prereq: permission. 4 cr.

French (FREN)

Department of Languages, Literatures, and Cultures
(See department note, page 31; program description, page 37; faculty listings, page 178; see also course listings under Italian.)

Coordinator: Jack A. Yeager

New students will be initially assigned to the proper course on the basis of their scores on the College Board Achievement Test or numbers of years of previous study. All courses are conducted in French unless otherwise noted. FREN 631 is the first course counting toward a major. Students educated in French-speaking countries may not register for courses below the 700 level without permission. No UNH or transfer credit will be given for elementary-level college courses in French if the student has had two or more years of French in secondary school.

401–402. Elementary French
For students without previous training in French. Aural comprehension, speaking, writing, reading. Labs. (No credit for students who have had two or more years of French in secondary school; however, any such students whose studies of French have been interrupted for seven years or more should consult the department chairperson about possibly receiving credit.) Special fee. 4 cr.

425. Introduction to French Studies
Taught in English, designed for students interested in exploring the history, literature, and culture of France and other French-speaking countries. Learning by means of guest speakers, and multimedia. Prepares for FREN 401-402. Does not satisfy B.A. foreign language requirement, but does satisfy the general education requirement(s) for foreign culture and the prerequisite for the French studies minor. (Also listed as WLCE 425F.) Special fee. Writing intensive. 4 cr. (Offered spring semesters and occasional summer semesters.)

500. Selected Topics in World Literature
Topics will be chosen which introduce students to major themes and genres. (Also offered as CLAS 500, GERM 500, ITAL 500, PORT 500, RUSS 500, SPAN 500, WLCE 500.) May be repeated for credit. Writing intensive. 4 cr. Cr/F.

501. Review of French
Emphasis on active use of spoken French. Review of basic grammar. Labs and films. Designed primarily for those whose study of French has been interrupted and for those who have had only two years of high school French. Special fee. 4 cr.

503–504. Intermediate French
Review of grammar with emphasis on the development of reading, writing, speaking, and listening skills, and on culture. Discussion in French of literary and cultural readings. Labs and films. Special fee. Writing intensive. 4 cr.

521. French Prose in Translation
Works affecting French thought from the Renaissance to the modern period. Readings, discussion, papers in English. Not for major credit. Writing intensive. (Also offered as WLCE 521F.) Special fee. Writing intensive. 4 cr. (Not offered every year.)

522. French Drama in Translation
Major works of comedy, tragedy, and drama. Molière and Racine to the present day. Readings, discussions, papers in English. Not for major credit. (Also offered as WLCE 522F.) Special fee. 4 cr. (Not offered every year.)

525. Introduction to French Civilization and Culture
French civilization from a variety of perspectives and topics. Includes historical, geographical, and artistic expressions of French culture. Readings, discussion, and papers in English. Not for major credit. May be repeated for credit barring duplication of materials. (Also listed as WLCE 525F.) Special fee. Writing intensive. 4 cr. (Not offered every year.)

#526. Introduction to Francophone Cultures
Focus on French-speaking cultures other than France. Includes historical, geographical, and artistic expressions of these cultures. Readings, discussion, and papers in English. Not for major credit. May be repeated for credit barring duplication of materials. (Also listed as WLCE 526F.) Special fee. Writing intensive. 4 cr. (Not offered every year.)

585. Intermediate Language Study in France
Equiv. to FREN 503, requires four weeks of intensive study of French language and culture at the Centre International d'Études des Langues (CIEL) in Brest, France. Prereq: FREN 501 or French 4 in a U.S. high school, with a grade of C+ or better and permission. Special UNH administrative fee and DCE registration fee. Student responsible for personal and travel expenses, and tuition costs in France. Special fee. 4 cr. (Offered summers only.)

586. Intermediate Language Study in France
Equiv. to FREN 504, requires four weeks of intensive study of French language and culture at the Centre International d'Études des Langues (CIEL) in Brest, France. Prereq: FREN 503 or 585 with a grade of C+ or better and permission. Special UNH administrative fee and DCE registration fee. Student responsible for personal and travel expenses and tuition costs in France. Special fee. 4 cr. (Offered summers only.)

595. French Practicum
Practical use of French language or cultural skills outside the classroom through special projects. Prereq: permission. May be repeated up to 4 credits. 2 cr.

631-632. Advanced French Conversation and Composition
Rapid review of basic grammatical structures and in-depth study of more complex linguistic patterns. Vocabulary building. Frequent written compositions and oral presentations using materials on contemporary culture taken from various media. Students develop phonetics and oral/aural skills in lab and class. Prereq: C or better in FREN 504. Required for majors. Special fee. Writing intensive. 4 cr.

651, 652. Readings in French Literature
Reading and rigorous oral and written analysis of texts selected to illustrate important themes/genres in French literature. May be taken in any order. Pre- or coreq: FREN 631-632. Required for majors. Special fee. Writing intensive. 4 cr.

675. Topics in French Civilization
Topics drawn from all aspects and periods of French civilization. Prereq: FREN 631-632. Coreq: 651 or 652. Special fee. May be repeated for credit barring duplication of materials. Writing intensive. 4 cr. (Not offered every year.)

676. Topics in Francophone Cultures
Topics drawn from all aspects and periods. Prereq: 631-632. Coreq: FREN 651 or 652. Special fee. May be repeated for credit barring duplication of materials. Writing intensive. 4 cr. (Not offered every year.)

677. France in the European Union
Topics drawn from all aspects of contemporary French culture in its relationship with the fifteen member states of the European Union, with emphasis on the role of France in the building of the European Union. Special fee. Prereq: FREN 631-632. Coreq: FREN 651 or 652. Writing intensive. 4 cr. (Not offered every year.)

683. Advanced Language Study in France
Equivalent to FREN 631, this course requires four weeks of intensive study of French language at the Centre International d'Études des Langues (CIEL) in Brest, France. Prereq: FREN 504 with a grade of C or better and permission. Special UNH administrative fee and DCE registration fee. Student responsible for personal and travel expenses and tuition costs in France. Special fee. 4 cr. (Offered summers only.)

684. Advanced Language Study in France
Equivalent to FREN 632, this course requires four weeks of intensive study of French Language at the Centre International d'Études des Langues (CIEL) in Brest, France. Prereq: FREN 504 or FREN 683, with a grade of C or better and permission. Special UNH administrative fee and DCE registration fee. Student responsible for personal and travel expenses and tuition costs in France. Special fee. 4 cr. (Offered summers only.)

685-686. Junior Year at the University of Burgundy
Studies at the University of Burgundy (in Dijon, France) for juniors who have completed their sophomore year at UNH and have passed with a grade of B or better FREN 631-632, FREN 651, and FREN 652. Students are expected to take French courses in each semester of their freshman and sophomore years. Attendance required at orientation sessions during the second semester of sophomore year. Interested students should consult the director of the program. Prereq: permission. (Not for graduate credit.) Special fee. 32 cr. Cr/F.

762. 17th-Century French Literature
Prereq: FREN 651 and 652 or equivalent. Special fee. Writing intensive. 4 cr. (Offered fall semester in alternate years.)

765. 18th-Century French Literature
Prereq: FREN 651 and 652 or equivalent. Special fee. Writing intensive. 4 cr. (Offered spring semester in alternate years.)

775. 19th-Century French Literature
Prereq: FREN 651 and 652 or equivalent. Special fee. Writing intensive. 4 cr. (Offered fall semester in alternate years.)

782. 20th-Century French Literature
Prereq: FREN 651 and 652 or equivalent. Special fee. Writing intensive. 4 cr. (Offered spring semester in alternate years.)

#785. Topics in Francophone Literatures
Readings in French literatures from outside of France (e.g., Québec, Africa, the Caribbean). Taught in French. Prereq: FREN 651 and 652. Special fee. Writing intensive. 4 cr. (Not offered every year.)

790. Advanced Language and Style
Translation of literary texts, intensive study of principal techniques of style, explications de texte. Required for major. Prereq: at least two literature courses in French numbered above 652. Special fee. Writing intensive. 4 cr. (Fall semester only.)

791. Methods of Foreign Language Teaching
Objectives, methods, and techniques in teaching foreign languages from elementary grades through college. Discussion, demonstration, preparation of instructional materials, microteaching of the language skills. Prereq: permission. Not for major or minor credit. 4 cr. (Fall semester only.)

795, 796. Special Studies in French Language and Literature
Individual guided study of the work of a major author, a genre, or specific topics in literature. Training in bibliography and organization of material. Prereq: permission. 1–4 cr. (Not offered every year.)

798. Seminar in French Literature
Topics chosen by the instructor. May be repeated for credit barring duplication of material. Prereq: FREN 651, 652; permission. 4 cr. (Not offered every year.)

799. Honors Senior Thesis
Yearlong course leading to an honors senior thesis. Open only to seniors seeking honors in major whose individually designed research projects have been approved by the dept. honors committee and who have been assigned an adviser. Students must enroll for both fall and spring semesters. Students defend the resulting written thesis in an oral presentation before dept. members and others. Prereq: permission. 2 cr./semester.

Genetics (GEN)

(For program description, see pages 79 and 88.)

Chairperson: Thomas D. Kocher
Professors: Ann C. Bucklin, Clyde L. Denis, Thomas P. Fairchild, J. Brent Loy, Subhash C. Minocha, Robert L. Taylor, Jr., Robert M. Zsigray
Associate Professors: John J. Collins, Thomas M. Davis, Anita S. Klein
Research Associate Professor: William A. Gilbert
Assistant Professors: Estelle M. Hrabak, Louis S. Tisa

702. Genetics Lab
An experimental approach to understanding the fundamental principles of heredity. Theoretical aspects of genetics hypothesis testing, data analysis, and techniques of isozyme and DNA electrophoresis and polymerase chain reaction (PCR). In lab, students conduct mating and mutagenesis experiments with plants, animals, and yeast; do human DNA fingerprinting; and employ techniques of DNA isolation, electrophoresis, PCR, cytogenetics, and statistical analysis to generate and interpret genetic data. Prereq: BIOL 604 or equivalent. Special fee. (Also offered as BIOL 702.) 4 cr.

705. Population Genetics
An exploration of the forces affecting the frequency and distribution of allelic variation in natural populations. The relative role of mutation, selection, random drift and inbreeding in structuring genetic variation. Quantification of the genetic structure of populations. Prereq: BIOL 604. (Also offered as ZOOL 705.) Special fee. Lab. 4 cr. (Not offered every year.)

706. Human Genetics
The genetic basis of human traits and diseases. New understanding added by molecular genetic approaches. Human genome project, gene therapy. Discussion of genetic components of quantitative and behavioral traits, and human evolution. (Also offered as BCHM 706.) 3 cr. (Not offered every year.)

711. Genetics of Eukaryotic Microbes
Expression and transfer of genetic material in eukaryotic microbes including fungi, algae, protozoa, and Caenorhabditis elegans. Laboratory experience in DNA sequence entry retrieval and analysis. Macintosh workstations are used for accessing and retrieving data from the National Library of Medicine and other sources via the Internet. Prereq: MICR 503; BIOL 604 (Also offered as BCHM 711 and MICR 711.) Special fee. Lab. 4 cr.

715. Molecular Evolution
Rates and patterns of evolutionary change in biomolecules. Forces affecting the size and structure of genomes. Molecular mechanisms of organismal evolution. Emphasis on integrating evidence from biochemistry, molecular genetics and organismal studies. Methods for reconstructing phylogeny from molecular sequences. Prereq: BIOL 604. Some knowledge of statistics and familiarity with personal computers is recommended. (Also offered as ZOOL 715.) Special fee. Lab. 4 cr. (Not offered every year.)

#722. Immunogenetics
Cellular interactions leading to immune regulatory mechanisms. Emphasis is placed on the major histocompatibility complex, immune responses, and antibody diversity. (Also offered as ANSC 722.) Lab. 4 cr. (Offered alternate years.)

723. Quantitative Genetics
Analysis of continuous variation in populations simultaneously segregating at multiple loci. Genetic and nongenetic factors and the complex interactions between them. Models and methods of analysis, for both theoretical and practical applications. Prereq: BIOL 604; BIOL 528 strongly suggested. (Also offered as ZOOL 723.) Special fee. Lab. 4 cr. (Not offered every year.)

753. Cytogenetics
Chromosome structure, function, and evolution. Eukaryotic genome organization. Theory of, and laboratory techniques for, cytogenetic analysis in plants and animals. Prereq: BIOL 604. Special fee. Lab. (Also offered as PBIO 753.) 4 cr. (Not offered every year.)

754. Laboratory in Biochemistry and Molecular Biology of Nucleic Acids
Application of modern techniques to the analysis of biomolecules, with an emphasis on nucleic acids; includes DNA isolation and analysis, cloning, sequencing and analysis of gene products. No credit if credit has been received for MICR 704. Prereq: BCHM 658/659; 751;/or permission. (Also offered as PBIO 754 and BCHM 754.) Special fee. Lab. 5 cr.

771. Molecular Genetics
Structure, organization, replication, dynamics, and expression of genetic information in eukaryotes. Focus on molecular genetic mechanisms of gene expression and its control; molecular genetics methods; molecular genetic control of cell division and differentiation during development. Prereq: BCHM 658 or 751; BIOL 604;/or permission. (Also offered as BCHM 771.) 3 cr.

774. Plant Cell Culture and Genetic Engineering
Theory and techniques of cell/tissue culture and genetic manipulation in plants, transformation vectors, somatic cell genetics, regulation of foreign gene expression, molecular basis of agriculturally important traits, environmental and social implications of genetic engineering in plants. Prereq: BIOL 604 or permission. Complements BCHM 765. Coreq: GEN 775. (Also offered as PBIO 774.) 3 cr.

775. Plant Cell Culture and Genetic Engineering Lab
Techniques of plant cell and tissue culture, protoplast fusion, genetic transformation and mutant cell selection, analysis of foreign gene expression. Coreq: GEN 774. (Also offered as PBIO 775.) Special fee. 2 cr.

782. Developmental Genetics
The molecular genetic basis of metazoan development. Focuses on how genes direct the process and how this problem is analyzed in model organisms using molecular genetic approaches. Topics include: control of cell division, maternal factors, cell-cell interactions, and differential gene expression. Prereq: BIOL 604; BCHM 658 or 751. (Also offered as BCHM 782.) 3 cr. (Not offered every year.)

Geography (GEOG)

(For program description, see page 38.)

Chairperson: Alasdair D. Drysdale
Professor: Alasdair D. Drysdale
Associate Professor: Debra L. Straussfogel
Assistant Professor: Barry D. Keim
Lecturer: Fay Rubin

401. Regional Geography of the Western World
Major culture areas of the Western world and the unique interaction of human and physical phenomena that produces the distinctive character of these areas. Emphasis on the manner in which people of different cultures have made use of the opportunities and solved the problems existing in the major regions occupied by Western culture: Europe, Russia, the Americas, and Australia and New Zealand. 4 cr.

402. Regional Geography of the Non-Western World
Major culture areas of the non–Western world and the unique interaction of human and physical phenomena that produces the distinctive character of

these areas. Emphasis on the manner in which people of different cultures have made use of opportunities and solved problems existing in the major regions occupied by non–Western cultures: the Middle East and North Africa, Africa south of the Sahara, Oriental Asia and the Pacific Islands. 4 cr.

473. Elements of Weather
Basic principles of weather phenomena and the physical processes underlying these phenomena. Emphasis on weather patterns of New England. Lab. 4 cr.

512. Geography of Canada
Historical and regional geography of Canada. Historical growth; development of its distinctive regions; contemporary prospects and problems. Resource base; exploration, settlement, population growth, cultural contrasts, economic development, and special relationship with the U.S. Required five-day field trip to Canada. Prereq: permission. Special fee. 4 cr. (Not offered every year.)

513. Geography of the United States
Geographical diversity of the U.S.: its physical setting, historical development, and contemporary spatial organization. Distinctive character and problems of major American regions; recent changes in economic, demographic, and social conditions. 4 cr. (Not offered every year.)

514. Geography of Canada and the United States
Historical and regional geography of Canada and the United States. Geographical diversity of the two countries; the development of distinctive culture regions; physical setting; resource base; settlement; population growth; economic development. Contemporary issues and problems. The particular relationship between the two countries. 4 cr.

#531. Geography of Western Europe and the Mediterranean
Regional and topical analysis of Western Europe and the Mediterranean. The geographical diversity of Europe in the context of physical setting and historical development. Present-day problems. 4 cr. (Not offered every year.)

540. Geography of the Middle East
Environmental, cultural, political-geographic, and ecological foundations of the Middle East. Selected regional problems and issues, e.g., geographical dimensions of the Arab-Israeli conflict, oil, urbanization, population growth, and nomadism. 4 cr. (Not offered every year.)

541. Geography of Japan
Examination of Japan's environmental setting, historical geographic evolution, distinctive cultural geographic patterns, population and settlement characteristics, internal spatial differentiation, economic growth, political geographic structure, and global importance. Writing intensive. 4 cr. (Not offered every year.)

570. Climatology
General survey of climate classification and the geographical distribution of climate types, interpretation and applications of climate data, and climate change over geologic time and issues of global warming. 4 cr. (Not offered every year.)

572. Physical Geography
Basic principles underlying the study of landforms. Emphasis is placed on their spatial distribution and the processes that shape the landscape. May be repeated. 4 cr. (Not offered every year.)

581. Human Geography
Differentiation of the world in terms of population, race, language, religion, political territory, and economic life. Collection and critical use of empirical data; emphasis on spatial and ecological analysis. 4 cr.

582. Economic Geography
Investigation of the manner in which resources and space have been organized for the production of goods and services: agriculture, the extractive industries, manufacturing, and the tertiary sector. Empirical studies, theories of location, and location models. Major contemporary problems and issues in agriculture and food supply, energy sources, industrial readjustment, and the global economy. (Also offered as EC 582.) Writing intensive. 4 cr. (Not offered every year.)

#583. Urban Geography
Spatial structure of cities and the city system. Emphasis on the North American city and its problems: land use, transportation, political fragmentation, physical environment, and residential patterns. Trends in urbanization in the developed and developing worlds. Global cities. 4 cr. (Not offered every year.)

584. Political Geography
Interactions between geographic and political phenomena at the sub-national, national, and international levels. Emphasis on geographical aspects of current political problems within and between states. 4 cr. (Not offered every year.)

590. Introductory Cartography
Map design, usage, and production; uses a broad range of map sources (aerial photography, remote sensing, geographic information systems, and traditional maps) as a basis for discussion. Includes several sessions using desktop mapping tools, as available. 4 cr.

#610. Geography of New England
The distinctive physical setting of New England, its settlement and development during the past three centuries, and the present-day problems and opportunities of the region. One Saturday field excursion near end of term. Special fee. 4 cr. (Not offered every year.)

673. Environmental Geography
Survey of interactions between human and Earth's physical environments. Attention focused on the geographical distribution of environmental problems. Topics include resource utilization, economic factors, population growth, food supplies, and air and water pollution. 4 cr. (Not offered every year.)

685. Geography of Population and Development
A regional approach to the study of population geography with concern for the interaction between the focus of economic growth and the components of population change and development. Considers the environmental impact of development trends in the developed and developing worlds and the relationship of these trends to sustainable growth and population patterns. (Also offered as EC 688.) 4 cr.

#690. Advanced Cartography
Organized in seminar fashion to study a selected major cartographic topic in detail. Emphasis on use of computers as cartographic tools. Potential topics include contour mapping, atlas design, and map perception. Prereq: GEOG 590 or permission. 4 cr. (Not offered every year.)

795. Special Project in Geography
Readings, library, archival, and fieldwork. Primarily for geography seniors. Prereq: permission. 2 or 4 cr.

796. Special Topics in Geography
Special topics in geography: A) Climatology; B) Environmental Geography; C) Urban Geography; D) Political Geography; E) Population Geography; F) Economic Geography; G) Cultural Geography. Prereq: permission. 4 cr.

797. Seminar in Geography
Exploration of geography as a research discipline. Definition and investigation of research problems. Primarily for geography seniors. 4 cr.

Geology

(See Earth Sciences.)

German (GERM)

Department of Languages, Literatures, and Cultures
(See department note, page 31; program description, page 39; faculty listing, page 178.)

Coordinator: Mary E. Rhiel

New students will be initially assigned to the proper course based on their scores on the College Board Achievement Test or number of years of previous study. New students are encouraged to present scores on the German Advanced Placement (AP) Test for UNH course credit and for placement at an advanced level. No transfer or UNH credit can be given for elementary German (401-402) if the student has had two or more years of that language in secondary school unless a significant amount of time has elapsed since completion of the last course. Students may petition the German program to be admitted to the 400-level courses for credit. Students considering a major or minor in German should consult with the program as early as possible to plan a meaningful sequence of study and to discuss options for studying abroad. All courses are conducted in German unless otherwise indicated.

401-402. Elementary German
For students without previous training in German. Aural comprehension, speaking, writing, reading, language labs. No credit for those with two or more years of German in secondary school (for exceptions, see above). Special fee. 4 cr.

#403-404. German for Reading Knowledge
Reading in the natural, physical, and social sciences and the humanities for students without previous

training in German. No credit for those with two or more years of German in secondary school. Special fee. 4 cr.

500. Selected Topics in World Literature
Topics will be chosen which introduce students to major themes and genres. (Also offered as CLAS 500, FREN 500, ITAL 500, PORT 500, RUSS 500, SPAN 500, WLCE 500.) May be repeated for credit. Writing intensive. 4 cr. Cr/F.

#501. Review of German
Refresher course for those whose study of German has been interrupted or who have had no more than two years of high school German. Emphasis on oral-aural practice; review of basic structures; reading and writing to develop active command of the language. Special fee. Lab. 4 cr.

503-504. Intermediate German
Review of grammar; practice in oral and written expression; readings and cultural material. Prereq: GERM 401-402 or equivalent. Special fee. Labs. 4 cr.

520. Women in German Literature and Society (in translation)
A study of representative works by and about women in German society from the 18th century to the present. Texts discussed include fiction, fairy tales, autobiography, interviews, poetry, diaries, historical essays, and film, as well as selected critical works on the history of German feminism and feminist aesthetics. May be taken for major credit. Can be used to fulfill gen ed Group 8: works of literature, philosophy, and ideas. (Also listed as WLCE 520G.) Special fee. 4 cr.

#521. Major German Authors in English
Selected masterpieces of the 18th, 19th, and 20th centuries by authors such as Goethe, Heine, Mann, Kafka, Hesse, Bachmann, Koeppen, Brecht, Frisch, Wolf, and Dürrenmatt. Readings and discussions in English. May be taken for major credit. Can be used to fulfill gen ed Group 8: works of literature, philosophy, and ideas. (Also listed as WLCE 521G.) Special fee. 4 cr.

#523. Women and German Film
Acquaints students with major German film texts. Asks gender-specific questions about German film history, male and female film makers, the construction of sexuality through film images and narrative, and the impact of feminism on these. In English. Can be used to fulfill gen ed Group 5: foreign cultures. (Also listed at WLCE 523G.) Special fee. 4 cr.

524. A Special Topic in German Film
Using analytical and critical tools, students read film texts as aesthetic works (with a form and a narrative) and as historical works (with a social function). Culminates in an investigation of a distinct historical period of German film or of a particular theme through the history of German film. (Also listed as WLCE 524G.) Special fee. 4 cr.

525. Introduction to German Culture and Civilization
Aspects of the political, social, and cultural life of Germany, Austria, and Switzerland. Conducted in English. Required of German majors; strongly recommended for any students planning study abroad in a German-speaking country. Can be used to fulfill gen ed Group 5: foreign cultures. (Also listed as WLCE 525G.) Special fee. 4 cr.

600. Selected Topics in World Literature
An interdisciplinary, modular course on a selected topic in world literature and culture, team-taught by instructors from three different foreign language groups. Each instructor teaches a 5-week module on the selected topic drawing from texts in the literature/culture of the instructor's area of specialization. Selected topics vary. May be repeated for credit. 4 cr.

601. Introduction to German Literature
Reading and analysis of poems, dramas, and short prose; introduction to theory of literary forms and methods of analysis. Required of all German majors; must be taken as soon as possible after GERM 504. Prereq: knowledge of German. Special fee. 4 cr.

624. Topics in German Cultural Studies
Exploration in depth of a specific topic in German cultural history, using the interdisciplinary methods of cultural studies. Texts and discussion are in English. May be repeated to a maximum of 8 credits. 4 cr.

#625–626. Summer Seminar in Berlin
Explores the recent history, culture, and politics of the once-divided city of Berlin. Addresses German unification and the everyday effects of the end of the Cold War, including the questions of resistance, multiculturalism, and the recent resurgence of racist violence. Includes intensive language, lecture, readings, discussion, and a final project. Prereq: GERM 504 or equivalent; permission. Special fee. 8 cr.

#630. German Narrative Forms
Textual studies based on works from one of the following prose genres: novel; novella; autobiography; fairy tale; short prose (short story, parable, documentary prose, feuilleton). Focus on the nature and characteristics of the genre, thematic and stylistic features of each text, and the diverse cultural, political, gender, or national perspectives that generate these forms. Special fee. 4 cr.

631. Advanced Communication Skills I
Intensive practice in vocabulary building and developing a sense of appropriate style for various contexts of oral and written communication. Special emphasis on conversational and expository speaking. Discussion of topics of current interest, oral reports, role play, and simulation of everyday situations, reinforced by written work. Required for the German major and minor. Special fee. 4 cr.

632. Advanced Communication Skills II
Intensive practice in vocabulary building and coherent expression in a variety of stylistic contexts. Special emphasis on writing skills, from expository prose to letter and résumé writing, essays, journalistic reports, and creative writing, focusing on topics of current interest. Required for the German major. Special fee. 4 cr.

#640. German Drama
Selected masterpieces of the German theatre from the 18th century to the present, including reception and performance history. Course may vary in emphasis from classical German tragedy and comedy to more modern forms such as didactic and documentary plays, tragicomedy, and farce. Special fee. Writing intensive. 4 cr.

#645. Contemporary German Literature
Literary trends in the German-speaking countries since 1945. Analysis and interpretation of works by major authors. Special fee. Writing intensive. 4 cr.

#685, 686. Study Abroad
A summer, semester, or year of study in one or a combination of the departmentally recognized programs such as the New England Universities Salzburg Program (UNH students as consortium members receive a discount on this program), the work-study program in Hamburg, or any other appropriate, approved programs. Open to students of any major with GERM 504 or equivalent training. Financial aid applies to all approved programs. Interested students should inquire at department for program brochures and specific requirements and should apply in consultation with a German adviser. For information on other study abroad programs, students should contact the Center for International Education. Variable to 16 cr. Cr/F. An IA grade will be assigned until official transcript is received from the foreign institution.

720. Images of Women in German Literature
Reading and analysis of original texts by both male and female authors from the Middle Ages to the present with a view toward the changing representation and self-concept of women. Critical approaches to the literary canon. Prereq: GERM 504 or equivalent experience. Special fee. 4 cr.

#721. German Culture and Civilization
Historical, social, artistic, and folkloristic developments in German-speaking countries from the beginning to the present. Prereq: GERM 525 or permission of instructor. Special fee. 4 cr.

#723. Survey of Preclassical German Literature
Lecture and readings in German literature from its Germanic beginnings to the Enlightenment. Special fee. 4 cr.

724. The Age of Goethe
Major literary movements between 1770 and 1832. Reading and analysis of selected works. Special fee. Writing intensive. 4 cr.

#727. German Literature of the 19th Century
Major literary movements from Goethe's death to the unification of Germany by Bismarck (1832–1872). Reading and analysis of selected works. Special fee. Writing intensive. 4 cr.

728. Modern German Literature
Major literary movements from 1872 to 1945. Reading and analysis of selected works. Special fee. Writing intensive. 4 cr.

#733. History and Structure of the German Language
An analysis of the history and structure of the German language from Indo-European to New High German with an emphasis on phonology and morphology. Prereq: GERM 632 or equivalent. 4 cr.

791. Methods of Foreign Language Teaching
Objectives, methods, and techniques in teaching foreign languages from elementary grades through college. Discussion, demonstration, preparation of instructional materials, microteaching of the language skills, including developments in computer-assisted instruction. Prereq: permission of instructor. Special fee. 4 cr.

795, 796. Independent Study
Open to highly qualified juniors and seniors. To be elected only with permission of the department

chairperson and of the supervising faculty member or members. Barring duplication of subject, may be repeated for credit. 1–4 cr.

#797, 798. Special Studies in German Language and Literature
Selected topics in language, culture, and literature. 2 or 4 cr.

Gerontology (GERO)

(For program description, see page 100.)

Advisor: Elizabeth L. Crepeau

600. Introduction to Gerontology
Introduction to the study of normal aging and to the applied practice of service to the elderly. Primarily for minors but open to other students. Writing intensive. 4 cr.

795. Independent Study
Practical experience with elderly populations under supervision of designated faculty. 4 cr.

(See Nursing 670 for Issues in Health Care of the Aged.)

Greek (GREK)

Department of Languages, Literatures, and Cultures
(See department note, page 31; program description, page 39; see also course listings under Latin and Classics; for faculty listing, see page 178.)

New students will be initially assigned to the proper course on the basis of their scores on the College Board Achievement Test or number of years of previous study. Transfer credit will not be given for elementary-level college courses in foreign languages if a student has had two or more years of the foreign language in secondary school.

401–402. Elementary Classical Greek
Grammar, simple composition, and translation. For students without previous training in Greek. Special fee. 4 cr.

403–404. Elementary Modern Greek
Aural-oral practice and the study of fundamental speech patterns, reading, and writing to achieve a firm basis for an active command of the language. (No credit for students who have had two or more years of modern Greek in secondary school.) Special fee. Lab. 4 cr.

503–504. Intermediate Classical Greek
Readings from Xenophon, Plato, Herodotus, Euripides, and the New Testament. Prereq: GREK 402. Special fee. 4 cr.

#505–506. Intermediate Modern Greek
Short selections from modern Greek literature with grammar review and oral practice. Readings from such authors as Solomos, Cavafy, Palamas, Kazantzakis, Venezis, Myrivilis, Seferis, and Elytis. Prereq: GREK 404 or equivalent. Special fee. Lab. 4 cr.

595, 596. Directed Reading in Greek
Independent study of a classical, Byzantine, or modern Greek author. May be repeated. Prereq: GREK 503–504, or equivalent. 2–4 cr.

631–632. Greek Prose Composition
Review of Attic Greek grammar; study of Greek prose style; English to Greek translation. Prereq: permission. Special fee. 4 cr.

751, 752. Homer and the Archaic Period
Readings from the Iliad, the Odyssey, the Homeric hymns, Hesiod, Pindar, and the lyric poets. Prereq: permission. 4 cr.

753, 754. Advanced Studies in Athenian Literature
A) Aeschylus; B) Sophocles; C) Euripides; D) Aristophanes; E) Herodotus; F) Thucydides; G) Xenophon; H) Plato; I) Aristotle; J) Lysias; K) Demosthenes; L) Isocrates. Major Attic authors from the Battle of Marathon to the death of Alexander the Great. Prereq: permission. 4 cr.

#791. Methods of Foreign Language Teaching
Objectives, methods, and techniques in teaching foreign languages from elementary grades through college. Discussion, demonstration, preparation of instructional materials, microteaching of the language skills. Prereq: permission. Special fee. 4 cr.

795, 796. Special Studies in Greek
A) Pre-Socratic Philosophers; B) Hellenistic Greek Authors; C) Menander; D) Callimachus; E) Apollonius of Rhodes; F) Theocritus; G) Polybius; H) Greek Authors of the Roman Empire; I) Plutarch; J) Septuagint; K) New Testament; L) Greek Church Fathers; M) Byzantine Authors; N) Spoken Greek; O) Advanced Greek Composition; P) Introduction to Classical Scholarship; Q) Greek Epigraphy; R) Greek Dialects; S) Comparative Grammar of Greek and Latin; T) Homer: A Linguistic Analysis; U) Greek Institutions; V) Paleography and Textual Criticism. Topics selected by instructor and student in conference. Prereq: permission. 4 cr.

Health and Human Services

(See School of Health and Human Services.)

Health Management and Policy (HMP)

(For program description, see page 69.)

Chairperson: James B. Lewis
Chairperson: James B. Lewis
Professors: David A. Pearson, Jeffrey Colman Salloway, John W. Seavey, Lee F. Seidel
Associate Professors: Marc D. Hiller, James B. Lewis, Richard J. A. Lewis
Research Associate Professor: Michelle R. Solloway
Assistant Professor: Theodore D. Peters
Research Assistant Professor: Tamara A. Martin

400. Introduction to Health Management and Policy
Acquaints incoming freshmen and sophomore HMP majors to the administrative roles, functions, settings, and professional expectations of health management professionals. Provides an overview of health care organizations and services. Students visit selected health care organizations and talk with professionals. Prereq: HMP majors only, freshman or sophomore. Special fee. 2 cr.

401/401W. U.S. Health Care Systems
Nature and functions of health care services and health professionals; impact of social, political, economic, ethical, professional, legal, and technological forces on health care systems. Current health policy issues. 401W is writing intensive. 4 cr.

501. Epidemiology and Community Medicine
The distribution and determinants of disease, illness, and health in the community. Community health and illness measures, health status, and sources of data. Development of hypotheses and study designs to reduce community health problems using epidemiological reasoning, methods, and analyses. Special fee. Lab. 4 cr.

#510. Hospitals in the 20th Century
Examines the development of hospitals in the United States since 1900. Emphasizes the social power of the hospital as a changing social institution in American society. 4 cr.

#555. Nursing Facility Management
Describes and analyzes the role, organization, function, and characteristics of nursing homes. Examines their administration, staffing, financing, planning/marketing, and regulation. Includes residents' psychological, biological, and sociological needs. Addresses several core information areas for nursing home administrators. Prereq: permission. Majors not permitted. 4 cr.

600. Special Topics
A) Hospital Management; B) Long-term Care Management; C) Ambulatory Care Management; D) Clinical Services Management; E) Home Care Management; F) Mental Health Management; G–Z) Interdisciplinary. May repeat, but may not duplicate subject areas. Prereq: junior major or permission. 1–4 cr.

621. Prepracticum Seminar
Preparation for field practicum experience, orientation to experiential learning and competency development. Prereq: major. 2 cr.

622. Field Practicum
Experiential learning in a health organization; application of theories to practice. Planned learning objectives are accomplished through three distinct components. Supervision by agency personnel. Prereq: junior major; permission.
622A, Field Practicum Organizational Analysis: analysis of assigned health care agency, from external and internal viewpoints. Coreq: 622B; 622C. 1 cr. Cr/F.
622B, Field Practicum Management Skills Development: development of the basic quantitative and interpersonal skills required of a health services manager. Coreq: 622A; 622C. 1 cr. Cr/F.

622C, Field Practicum Project Analysis: demonstration of knowledge and analysis of specific problem-solving skills required during internship. Coreq: 622A; 622B. 1 cr. Cr/F.

710. Financial Management for Clinicians
Basics of health care financial management and cost accounting. Includes cost concepts and product costing, budgeting, and variance analysis with emphasis at the departmental level. Contains basic accounting principles: use of ratio analysis to examine balance sheets and revenue and expense statements. Explores capital project analysis and health care reimbursement. Prereq: HMP 401 or equivalent; permission. Majors not permitted. 4 cr.

721. Managing Health Care Organizations
Organizational characteristics of ambulatory, acute, and long-term care facilities. Management issues and strategies involving governance, clinical services, human and fiscal resources, and community-based services. Prereq: major or permission. 4 cr.

723. Health Planning
Theoretical and historical foundations of health planning; the relationship of health planning and regulation; the application of planning methods; and the utilization of strategic planning and its relationships to marketing. Prereq: major or permission. Special fee. 4 cr.

#734. Health Law
Concepts and principles of law as these affect medical and administrative decision making in health care institutions and the ability to discern issues that warrant the advice and/or assistance of legal counsel. Topics covered include corporations and antitrust, property law, patients' rights under law, and malpractice. Prereq: major or permission. 4 cr.

739. Health Care Accounting
Principles and practices used to record, summarize, and report financial transactions of health care organizations. Topics include fund accounting, cost accounting, ration analysis, cost analysis, and budgeting. Not open to students who have completed ACFI 501. Prereq: HMP major or permission. Special fee. Lab. 4 cr.

740. Health Care Financial Management
Techniques, principles, and practices of managing fiscal aspects of health care organizations. Exploration of concepts and techniques associated with variance analysis, cost allocation, management of working capital, and capital decision analysis. Analysis of the impact of rate setting and reimbursement on health care organizations. Prereq: HMP 740; HMP major or permission. Special fee. Lab. 4 cr.

741. Management Methods for Health Care Organizations
Methods from industrial engineering, operations research, and statistics to support management systems used in health care organizations. Application areas include demand forecasting and the design and analysis of service systems. The role and function of information systems. Prereq: permission. 4 cr.

742. Strategic Management for Health Care Organizations
Application of managerial methods involving financial, marketing, and operational analysis to health management. Case studies. Prereq: major or permission; HMP 740. Special fee. Lab. 4 cr.

#743. Health Care Reimbursement
Explores concepts and techniques associated with paying providers of health care. Impact of current practices and future trends on health care providers and U.S. health care system. Prereq: major or permission. 2 cr.

744. Ethical Issues in Health Management and Medicine
Ethical theories and decision-making models; patients' rights and professional responsibilities; social justice and resource allocation; critical issues facing clinicians, managers, and health policy makers; managerial versus medical care conflicts. Prereq: major or permission. Writing intensive. 4 cr.

746. Health Policy
Analysis of the public policy process, the development of health policies in the United States, and discussion of specific health policy issues. Prereq: major or permission. 4 cr.

748. Health Policy Analysis
Public policy outputs analyzed for effectiveness, efficiency, and equity, focusing on public policies in the United States. May be repeated. Prereq: major or permission. Special fee. Lab. 4 cr.

#750. Comparative Health Care Systems
Analysis and comparison of world health problems and delivery systems using nations with different cultures, political and economic systems, and stages of economic development. Methods for developing and evaluating health care systems. 4 cr.

#755. Aging and Long-Term Care Policy
Analyzes significant contemporary public policy issues associated with the aging population and the continuum of long-term care in the United States. Emphasis on costs associated with and approaches to financing, accessibility, delivery, and quality of home-based, community-based, and institution-based health care services. Prereq: major or permission. 4 cr.

796. Independent Study
In-depth study with faculty supervision. Prereq: permission of major adviser and faculty in the area concerned. 2–4 cr.

798H. Honors Project/Research Design
Examines selected research designs and methods used in health services research/program evaluation. Establishes theoretical and methodological foundation for honors-in-major research project to be conducted during the subsequent semester under a faculty member's supervision. Prereq: senior honors-in-major status and permission. 2 cr.

799H. Honors Project/Research
In-depth research project (conducting and analysis) under supervision of faculty member. Includes scholarly presentation of findings to faculty and other interested parties and preparation of manuscript suitable for publication in peer-reviewed journal. Prereq: HMP 798H and permission. 4 cr.

Health Promotion (HP)

(For program description, see page 100.)

540/540W. Life Style and Human Behavior
Examines contemporary health concerns in terms of life style and environmental and sociocultural dimensions. Focuses on theories related to individual health behaviors and behavioral change. Analyzes risk factors, identifying strategies to promote health. 540W is writing intensive. 4 cr.

740. Health Promotion Seminar
Examines contemporary health concerns in terms of life style, environmental, and sociocultural dimensions. Focus on theories relating to health behavior and behavioral change. Analyzes risk factors and identifies strategies to reduce risk. Special fee. 4 cr.

History (HIST)

(For program description, see page 39.)

Chairperson: J. William Harris, Jr.
Professors: Jeffry M. Diefendorf, Francis D. McCann, Jr., Robert M. Mennel, Janet L. Polasky, Harvard Sitkoff, Douglas L. Wheeler
Adjunct Professors: Michael J. Donnelly, Stephen H. Hardy, Dennis A. O'Toole, Laurel Ulrich, William R. Woodward
Associate Professors: W. Jeffrey Bolster, Ellen Fitzpatrick, David Frankfurter, Cathy A. Frierson, Jan V. Golinski, J. William Harris, Jr., Gregory McMahon, Lucy E. Salyer, Marc L. Schwarz
Assistant Professors: Funso Afolayan, Kurk Dorsey, Eliga H. Gould, Nicoletta F. Gullace, Yan Lu, Bernard Schlager, Jennifer D. Selwyn, Cynthia J. Van Zandt, Ethel Sara Wolper
Adjunct Assistant Professor: Deborah J. Coon

Group I. American History

405. History of Early America
America from the early age of European discovery to the mid-19th century. Emphasis on the interaction of European, Native American, and African peoples; on the separation of the English colonies from Great Britain; and on the establishment and early history of the United States. Not open to majors or minors who elected HIST 410. 4 cr.

406/406W. History of the Modern United States
History of the United States since the mid-19th century. Political, social, and economic developments as well as relationships of the modern U.S. with other countries. Not open to majors or minors who elected HIST 410. 406W is writing intensive. 4 cr.

410. Historical Survey of American Civilization
Topical survey, within broad chronological divisions, of the development of American civilization since 1600. Not open to majors or minors who elected HIST 405 or 406. Writing intensive. 4 cr.

505, 506. African American History
Experiences, aspirations, and contributions of black Americans from their ethnic origins in Africa to

the present American crisis in race relations; comparative study of cultures and institutions. HIST 506 is writing intensive. 4 cr.

507. Native Peoples of the Americas
Indian societies of the American continents, their reactions to, and interactions with, the Europeans who invaded and conquered them. Emphasis on North America. 4 cr.

509. Law in American Life
Investigates the role of law in American social, political, and economic life from the European settlements to the present. Traces the development of legal institutions, but focuses on the various functions of law (e.g., in structuring social relationships, allocating resources, defining governmental authority, expressing social and moral values, and as a mechanism for control). 4 cr.

511. History of New Hampshire
From presettlement times to the present, emphasizing the use of locally available materials and sources. 4 cr.

566. Women in American History
Key changes in women's roles in the past three centuries with an emphasis upon the peculiarities of the American setting. How, for example, were women's lives affected by the frontier; the intersection of European, African, and native American cultures; religious diversity; the problem of defining citizenship in a democratic republic? Students will sample recent scholarship in women's history and study a wide variety of documents produced by women. 4 cr.

567. History of Canada
Covers the development of Canada from first contacts to the modern era, with an emphasis on the twentieth century. Particular focus is on Canada's position between Great Britain and the United States, Anglo-French tensions internally, and the shifting place of the First Nations in Canadian society. 4 cr.

603. The European Conquest of America
Study of the social consequences of colonization, migration, and war in America, 1500–1775. Emphasis on the interaction of British colonies with competing European cultures (French, Dutch, Portuguese, and Spanish), with Native Americans, and with African American slaves. 4 cr.

605. Revolutionary America, 1750-1788
Examines the social, political, and cultural transformation of thirteen British colonies into the United States, up to the adoption of the Constitution. 4 cr.

#606. History of the Early Republic
Explores the histories of the people and institutions that transformed the new United States from a coastal republic of largely independent freeholders to a transcontinental democracy increasingly riven by class. Topics include slavery, the family, reform movements, and the formation of national identity. 4 cr.

#607. The American Character: Religion in American Life and Thought
Interdisciplinary study of the American religious experience and its relationship to other aspects of American culture, taught by a team of three specialists, each in a different discipline: American intellectual and cultural history, American literature, and American church history. Central emphasis on several transforming themes of the 19th century and their effects upon the interplay of religion and society. (Also offered as ENGL 607, HUMA 607, and RS 607.) 4 cr.

#608. Arts and American Society: Women Writers and Artists, 1850–Present
Team-taught course studying the impact of gender definitions on the lives and works of selected American artists. Considers lesser-known figures such as Fannie Fern, Lilly Martin Spencer, and Mary Hallock Foote as well as better-known artists such as Willa Cather and Georgia O'Keeffe. Prereq: permission or one of the following: WS 401, HIST 566, ENGL 585 or 586, ENGL 685 or 785, or a 600-level art history course. Writing intensive. (Also offered as ARTS 608, ENGL 608, and HUMA 608.) 4 cr.

609. American Legal History: Special Topics
In-depth thematic exploration of law in American life. Topics include race and equality in America; community, pluralism, and American law; property, liberty, and law; gender and law. May be repeated for credit with instructor's permission. Prereq: HIST 509 or instructor's permission. Consult department for listing of topics. 4 cr.

#610. American Studies: New England Culture in Changing Times
A team of three instructors from history, literature, and art investigates major contributions New England has made to American life. Focus on three periods: the Puritan era, 1620–90; the Transcendental period, 1830–60; and the period of emerging industrialism in the late 19th century. Prereq: second semester sophomore. (Also offered as ARTS 610, ENGL 610, and HUMA 610.) Not for art studio major credit. 4 cr.

611. The Civil War Era
Surveys the period from the presidency of Andrew Jackson to the end of the Reconstruction. Focuses on causes, course, and consequences of the Civil War. Topics include slavery in the Old South, antebellum reform movements, creation and breakdown of the Second Party System, social and economic (as well as military) events during the war and major developments during Reconstruction after the war. 4 cr.

#612. Emergence of Industrial America
Investigates the economic transformation of 19th-century America from a rural, agricultural society to an urban, industrial one. Explores the sweeping economic changes and focuses on such topics as change in work and leisure, westward expansion and its effects on Native Americans, shifts in gender roles, growth of a consumer culture, rise of the labor unions and populism, immigration, reform and regulation movements, growth of American imperialism, and intellectual developments. 4 cr.

#615, 616. 20th-Century America
U.S. after 1900; cultural, political, and social factors causing major changes in American life. Semester I: Progressivism through the New Deal. Semester II: World War II to the present. 4 cr.

617. The Vietnam War
An advanced interdisciplinary study of the American experience in Vietnam which utilizes fiction, film, music, and historical analysis to examine such matters as how and why the United States became involved in Vietnam, went to war there, and failed to win, as well as the consequences and legacies of that fateful conflict. It is strongly suggested that students first complete courses in modern American history. 4 cr.

#619, 620. The Foreign Relations of the United States
The history of American diplomacy from the colonial era to the present, with the dividing point at 1900. The focus will be on both the foreign and domestic influences that shaped American diplomacy. 4 cr.

#621, 622. History of American Thought
Significant American thinkers considered in their social context. Semester I: 1600 to 1860. Semester II: 1860 to the present. HIST 622 is writing intensive. 4 cr.

#623. Anglo-American Social History
Study of everyday life in British America and the early United States, 1600–1820, with an emphasis on gender, class, and race. Consideration of childbearing, labor systems, religious observance, crime, and other themes in the light of recent social theory. Readings in both primary and secondary literature, with an emphasis on local records and on material culture. 4 cr.

624. Topics in Modern U.S. Social History
Advanced study of topics in U.S. social history since the Age of Jackson. Topics will vary; and may include such examples as slavery and the antebellum South; reform movements in U.S. history; family history; labor history; the impact of war on American society; race in recent U.S. history. May be repeated as topics change. 4 cr.

#625. Southern History and Literature since 1850
Equal focus on the history and literature of the South. Topics include slavery, the Civil War, Reconstruction, the age of segregation, and the civil rights movement. Literary focus on the "Southern Renaissance" of the 1930s and after, including works by William Faulkner, Robert Penn Warren, Flannery O'Connor, and Richard Wright. 4 cr.

626. Muslims in America
Exploration of the history of Muslim communities in the United States with the purpose of examining how these communities created spaces for Muslim practice and community formation. 4 cr.

Group II. European History

435, 436/436W. Western Civilization
The classical origins and evolution of European civilization through the Renaissance, Reformation, and voyages of discovery. The rise of Europe to global supremacy in the 19th century and its transformation in the 20th century. 436W is writing intensive. 4 cr.

#521. The Origins of Modern Science
Development of scientific ideas in Europe from the Renaissance through the Scientific Revolution to the Enlightenment. Topics include themes in the physical and biological sciences and their relations to cultural and social contexts. No special science background is required. 4 cr.

522. Science in the Modern World
Development of science, particularly in Europe and North America, from the 18th century to the present. Themes include Darwinism, the growth of modern physical and biological sciences, and science in the contemporary world. No special science background is required. 4 cr.

#523. Introduction to the History of Science
Introduces the role of science in Western culture, from the ancient world to the 20th century. Covers important themes of the development of the physical and biological sciences, and indicates their place in broader social and cultural changes. No specific technical background is required. 4 cr.

537. Espionage and History
Introduction to the history and politics of espionage and intelligence organizations in modern times. Special attention to intelligence work among the major powers in World War I, World War II, and the Cold War. Readings include autobiographical accounts and other primary sources as well as novels. 4 cr.

540. Foundations of Medieval History: 300–1300 CE
Introduction to the history of Western Europe from the end of the Roman Empire to the late twelfth century. Particular focus on the history of Christianity, social and economic structures, the role of women in medieval culture, and literacy and learning. Writing intensive. 4 cr.

#559, 560. History of Great Britain
History of Great Britain from the earliest times to the present; from social, constitutional, economic, political, and intellectual perspectives. Designed for history students as well as those interested in literature, Western political and social systems, American studies, education, and prelaw. 4 cr.

563. Introduction to Russian Culture and Civilization
Interdisciplinary course on the development of Russian culture from its origins through the end of the 19th century. Historical documents, literary works, ethnographic materials, films, slides of Russian art, and music. 4 cr.

565. Women in Modern Europe
A social history of women in Europe from 1700 to the present. Examines the development of the "modern nuclear family," transformations in women's work during the industrial revolution, and women's political evolution from bread rioters to hearth tenders to petitioners. Sources include published diaries, historiographical studies, and novels. 4 cr.

639. Christian Monasticism in the Medieval West
A multi-faceted exploration of Christian monastic life in Western Europe from its origins in pre-Christian history, through the early Desert Fathers and Mothers, St. Augustine and St. Benedict, to its flowering in the Cluniac, Cistercian, and mendicant reforms. The course will focus on the intellectual, artistic, and pastoral aspirations and achievements of medieval monastics. 4 cr.

#640. Holy War in the Holy Land: The Medieval Crusades
Survey of the medieval military expeditions organized by Christians to secure the Holy Land during the 12th and 13th centuries. Topics considered include the formulation of a "just war" theory; political, intellectual, religious, and military interactions between Christians, Jews, and Muslims; the Crusader State of Jerusalem; and the histories of individual crusades. 4 cr.

641. Europe after Black Death
Explores the dramatic changes that characterized Western Europe as it rebounded in the fifteenth through the seventeenth centuries from the ravages of the Black Death of 1348. Examines the social, political, and artistic developments in late medieval and Renaissance Italy before "crossing the Alps" to trace the expansion of Renaissance culture in Northern Europe. Topics covered include the humanist movement, new patterns of social organization, the revival of classical antiquity in the arts, architecture, religion and political theory, the effects on European society of the encounter with the "New World," shifting roles for men and women in early modern European societies, and religious war and conflict. 4 cr.

642. Religious Conflict in Early Modern Europe
Religious, social, and political maps of Europe were profoundly and permanently altered in the sixteenth and seventeenth centuries due to the split of the Protestant churches from the Roman Catholic church in 1517 by Martin Luther. Explores the background to the Protestant Reformation of the sixteenth century and investigates the various personalities—the Protestant and Catholic reformers, the princes, the artisans and peasants, the Anabaptist radicals—that shaped this era of religious change and conflict. Also explores the important effects of religious change on European society and culture at that time, including changes in gender roles, family life, and popular cultural practices such as magic and witchcraft. 4 cr.

647. Early Modern France
An exploration of the culture and politics of early modern French society. Popular culture, religion, gender relations, the family, state-building, political theory, and revolution will be emphasized. Primary documents in translation will be read and discussion encouraged. 4 cr.

648. Modern France
French society from Napoleon to Mitterand. Topics include the Revolution of 1848 and the Paris Commune; World Wars and the Vichy regime; Existentialism, DeGaulle, and the Revolt of May–June 1968. 4 cr.

#649. Comparative Topics in the History of Early Modern Europe
Topics will vary, but may include enlightenment and revolution; the peasantry; gender and the family; crime and deviance; science and society. May be repeated for a maximum of 8 credits. 4 cr.

#650. History of European Socialism
Socialist thought in Europe in the 19th and 20th centuries. Examines Utopian Socialism, the development of Marxism, the emergence of the New Left, and new socialist developments in the late 20th century. 4 cr.

651, 652. Topics in European Intellectual History
Exploration of such major developments as the Enlightenment, Russian intellectual history, ancient world views and cosmologies, and the relationship between gender and intellectual history. 651 includes topics up to the Scientific Revolution; 652 includes topics since the Renaissance. Since topics will vary, students should check the department newsletter or office for course theme in any given term. May be repeated as topics change. 4 cr.

654. Topics in History of Science
Advanced study of a selected topic in the history of European science since the Renaissance. (Topics vary.) 4 cr.

655. British History, 1688–1832
Examines British history from the Glorious Revolution to the passage of the First Reform Bill. Topics include the consolidation of parliamentary democracy, the rise of the middle-class family, and the emergence of a broad-based consumer society. We will also consider the integration of England, Scotland, and Ireland into a single British state, as well as the consequences of Britain's growing imperial power in North America, India, and Africa. 4 cr.

656. 20th-Century Europe
World War I, European totalitarianisms, World War II, the loss of European primacy, and the search for a new Europe. 4 cr.

659. History of Modern Spain and Portugal
Iberian states and their peoples from the coming of liberalism to the present. Failure of Iberian liberalism and liberal government. Political and social change, imperial and intellectual movements, influence of Western European thought and activity. 4 cr.

661, 662. England in the Tudor and Stuart Periods
Political, religious, socioeconomic, and intellectual forces for change at work in England from the accession of Henry VII to the revolution of 1688–89. 4 cr.

#663. Russia: Origins to 1905
Russia from its foundation through the Revolution of 1905. Political, social, and economic developments; intellectual and ideological currents. 4 cr.

664. Russia: Modernization through Soviet Empire
The challenges of modernization, experience, and legacy of Leninist and Stalinist revolutions, Soviet consolidation, and decline through the Gorbachev era. 4 cr.

#667. Germany from the Late Medieval Period Through the Reign of Frederick the Great of Prussia
Concentrates on the political, economic and social structure of the Holy Roman Empire, the Reformation in Germany, the Thirty-Years War, and the rise of Prussia. 4 cr.

#668. Germany from 1786 to 1918
Concentrates on the end of Holy Roman Empire and Napoleonic domination of much of Germany, the Prussian Reform Era, industrialization, the revolutions of 1848, national unification under Bismarck, the second Empire, and World War I. 4 cr.

669. Germany from 1918 to the Present
Begins with the revolution of 1918 and then explores the political, social, and intellectual character of the Weimar Republic, the rise and nature of Nazism, the Holocaust, the foundation of both the German Democratic Republic and Federal Repub-

lic and their evolution in the shadow of the Cold War, and concludes with the unification of Germany after the fall of the Berlin Wall in 1989. 4 cr.

#789. Seminar in the History of Science
In-depth examination of a selected topic in the history of science. Subject varies. Open to undergraduates with permission of the instructor. No special background in science required. 4 cr.

Group III. Non-Western History and Ancient History

421. World History to the 16th Century
The global experience of human communities with special emphasis on the development of the major civilizations and their interactions. Comparisons of social, cultural, religious, and political life and the emergence of distinctive and diverse human societies are examined. 4 cr.

422. World History in the Modern Era
Emergence of major global human interactions due to the growth of major civilizations. The global context for the rise of the modern West. The rise and decline of Western global domination and emergence of new states and changing societies throughout the world. 4 cr.

483. History of World Religions
Introduction to the religions of the world in terms of historical development, relationship to society, belief system, central texts, and ritual practices. Begins with the religions of small and tribal societies (e.g., African, Native American), moves through religions of complex societies (e.g., Hinduism), and then studies the various traditions that emanated from ancient revelations: Zoroastrianism, Buddhism, Judaism, Christianity, Islam, and certain new forms of Christianity. This initial survey of world religions prepares students for HIST 484. Writing intensive. 4 cr.

484. Patterns in World Religions
Introduction to the comparison of religions and religious patterns. Examines cross-cultural themes like sacred places, sacred books, and sainthood. Though readings, students become acquainted with methods used in the historical study of religions. Primary and secondary readings encompass a wide variety of religious practices and ideas in Hinduism, Buddhism, Christianity, Islam, Judaism, as well as tribal religions. Ethnographic films supplement readings and lectures. Some classes may be adjusted to accommodate guest lecturers in medieval European history. Prereq: HIST 483 recommended. Writing intensive. 4 cr.

#531. The Americas: Introduction to Latin America and the Caribbean
The thirty-three countries of the region are important trading partners and resource suppliers for the United States. Examines the history, culture, politics, economics, social structures, and the international relationships of this region. Ranges from the macro-level discussion of economics, to personal and family issues, to key moments in history, to aspects of local and transnational cultures. Individual community and country examples illustrate larger processes affecting the whole region. Stereotypes and generalizations challenged by stressing the human face of national development, military rule, democratization, migration, urbanization, color, class, identity, women's roles, religion, popular culture, sovereignty, revolution, and impact of migrants from the region on the United States. 4 cr.

532. Modern Latin America
Provides a broad overview of Latin America from the 18th century to present. It examines the breakdown of colonial rules, the establishment of independent countries, the formation of viable nation states, the importance of geography, the roles of the different elements of society. Social, political, and economic changes and continuities emphasized to give a sense of the ambiguities of the historical process. Cultural differences illustrated with slides and music. The effects of elite rule and of United States interventions studied. Writing intensive. 4 cr.

575. The Ancient Near East
From the neolithic revolution to the time of Alexander the Great. Rise of civilization; nature of human artistic and intellectual development in the earliest civilizations of Mesopotamia and Egypt; Judaism in its historical setting. 4 cr.

576. The Hebrew Bible in Historical Context
An introductory study of the Hebrew Bible, or Old Testament, examining the development of biblical literature in the context of ancient Near Eastern cultures and history. Interpretations of the creation stories and patriarchal narratives using literary and folklore methods; the transformation of Israelite religion from Moses to David to Ezra; the role of prophets and nature of ancient prophecy; the concept of the messiah; "wisdom" literature and the biblical interpretations of misfortune; the formation of a biblical canon; and the critical analysis of sacred texts. Writing intensive. (Also offered as RS 576.) 4 cr.

577. The New Testament in Historical Context
A study of the collection of writings known as the New Testament as both literature and historical documentation. Assigned readings from primary and secondary sources stress the historical, social, religious, and literary backgrounds of gospels, Paul's letters, and the Apocalypse, and will include a variety of early Christian texts left out of the canonical New Testament. Other more general themes are: the formation of the Christian canon, the division of the Jesus-movement from Judaism, the status of Jesus in his own time, the nature of parables, the end of the world, and the authority of women in early churches. Emphasis on the historical understanding of sacred scripture. Writing intensive. (Also offered as RS 577.) 4 cr.

579. History of China in Modern Times
The transformation of Chinese society from 1600 to the present. Attention will be given to political and cultural developments as well as China's interaction with the outside world. 4 cr.

580. State, Society and Culture in Modern Japan
Explores major tendencies in Japanese history from the Tokugawa period to present. Will stress the interrelatedness of political, social, institutional, and literary developments so as to achieve a complex view of modern Japanese society. 4 cr.

583. Mystic and Saint in Islam
Examination of how and why a cult of Sufi saints became such a significant part of religious practice in medieval Islamic Egypt and Anatolia. 4 cr.

585. History of the Middle East, 6th-15th Century
The origins and expansion of Islam and the development of the Muslim community from the time of Muhammad until the Islamic empires of the 16th century. Attention is given to religious and artistic as well as political developments. 4 cr.

586. History of the Middle East, 1453 to the Present
Emergence of modern Middle Eastern states and societies from the time of the Ottoman Empire to the present. A survey of major developments, including the emergence of nationalism, the Islamic resurgence, and social transformations. 4 cr.

587, 588. History of Africa South of the Sahara
From ancient times to the present. Semester I: from prehistoric times to 1870. Semester II: from 1870 to the present. African migrations, kingdoms, and societies; African responses to the slave trade; Islam; European imperialism, colonialism, and industrialization; African nationalism, independence, and postindependence problems. 4 cr.

589. Islam in Africa
Focuses on the advent, spread, and major consequences of Islam in Africa. Examines the major phases of Islamic expansion: early conquests in North Africa and the Iberian Peninsula, the spread of Islam across the Sahara into the Sudan, the jihadist and reformist movements of the 18th and 19th centuries and the development of Islam during the colonial and postcolonial era. Emphasis on the varieties of the practice of Islam, the role of Islam in states formation and the impact of Islam on the religious and social life of the African peoples. The intersections of Islam with the issues of trade, slavery, politics, gender, imperialism and modernization, the rise of Islamic fundamentalism, the place of North Africa within the Mediterranean Islamic culture, as well as the relationships of Islam with indigenous religions and with Christianity in African history and societies explored. 4 cr.

#590. The City in History
The preindustrial and modern city as a philosophical and cultural institution, with emphasis on city design and architecture. Certain great cities, such as Athens, Florence, Paris of 1900, and Berlin of the 1920s, dealt with in detail. 4 cr.

631. History of Brazil
Brazil has the fifth largest territory, the sixth largest population, and the eighth largest industrial/economy in the world. Its colorful history has many distinctive features; the only country in the Americas to have been the capital of a European monarchy and then to have its own emperor for most of the last century; its outwardly peaceful image masks internal violence and turmoil; a suspicion of foreigners balanced by a desire to be accepted by them as equals; seemingly benevolent racial attitudes that serve to keep people of color on society's lower range; a tremendous cultural creativity that has given the world samba, film star Carmen Miranda, composer Heitor Villa Lobos, songwriter Antonio Carlos Jobim, poet Vinicius de Morais, and novelist Jorge Amado. Includes an examination of the roles of various elites; political, social, economic, military, cultural, and religious. HIST 531, 532 recommended. 4 cr.

632. Latin American History: Topics
Topics vary (see department listing for current semester). Seminar entails reading, discussion, and

research on literature and documents related to the selected topic. Provides students with the opportunity to do research under close direction. 4 cr.

675. The Early History of Ancient Greece
Greek history from the Minoan and Mycenaean eras through the Persian Wars of the early fifth century. Emphasis on original sources including the Homeric epics, Plutarch, Sappho, and Herodotus. Examination of the distinctive developments of political systems in Sparta and Athens, as well as issues of colonization, diplomacy, religion, and culture. Through discussion of types of available evidence and their integration into historical understanding. 4 cr.

676. The Classical and Hellenistic Greek Worlds
Greek history from the Persian Wars of the early fifth century through the life of Alexander the Great and the creation of the Hellenistic world. Emphasis on original sources including Herodotus, Thucydides, the Athenian playwrights, and Plato. Examination of the transformation from city-state political organization to large Hellenistic kingdoms, as well as discussion of Greek historiography, intellectual life, and social theory. Thorough discussion of types of available evidence and their integration into historical understanding. 4 cr.

677. The Roman Republic
Covers pre–Roman Italy, the Etruscans, and the foundation of the Republic. Rome's expansion through the Punic Wars and relations with the Hellenistic kingdoms. Disintegration and final collapse of the Republic. Includes discussion of Roman art, engineering, and political theory. Emphasis on Latin sources in philosophy, history, and literature. 4 cr.

678. The Roman Empire
Collapse of the Roman Republic and creation of the Augustan principate. History of the principate through the division of the empire, with discussion of the fall of Rome in the west and the eastern empire through Justinian. Discusses Roman art, literature, philosophy, and religious developments such as the proliferation of mystery religions and the rise of Christianity. 4 cr.

681. Modern China Topics
Problems in modern Chinese history from 1800 to the present. Topics may vary. Students will read translated primary sources, analyze literary works, and write critical essays and a research paper. History 579 is recommended. 4 cr.

684. History of Southern Africa since 1652
Examination of the major themes in the history of a troubled sub-region of Africa. In-depth exploration of the nature and impact of socio-cultural formations, the evolution of centralized polities and societies, the initiation and expansion of white settlements, and the Mfecane revolution. Analysis of the dynamics and consequences of European imperialism, economic competition and industrialization, European settler-nationalism, racial conflict, slavery, class and gender politics, Indian and African nationalism, democratization, and development in post-colonial and post-apartheid Southern Africa. 4 cr.

#685. The Modern Middle East
From 18th century to the present. Problems created by modernization and reform of the traditional society; conservative reaction to reform, impact of nationalism, and appearance of new ideologies. 4 cr.

686. States and Societies in Precolonial West Africa
An in-depth exploration of the nature and dynamics of state formation processes in West Africa. Focuses on major states such as Ghana, Mali, Songhai, Asante, Dahomey, Oyo, Benin, Borno and the Hausa states. Through a critical analysis of primary and secondary sources, film footage and video documentaries, the course examines the significance of such issues as oral tradition, migrations, religion, art, slavery, gender, trade, state, kingship and warfare in African history. 4 cr.

#688. African Religions
An interdisciplinary introduction to basic principles of African religions including historical and recent developments in the study of religion in Africa. Covers the place of religion in African societies and the interralatedness of religion with myth, ritual, music, art, oralty, gender, economics, social process, illness and healing, and kingship and power. Particular attention to African religions in the Americas and the history and impact of Islam and Christianity in Africa. Helps students to understand what is typical about religion, what is special about African religion, and the role of religion in non-Western societies. Slides, films, maps and other visual aids as well as readings. 4 cr.

Group IV. Special Courses

425. Foreign Cultures
Introduction to the culture of a particular nation or region; preparation for experiencing a foreign culture. Consult department for listing of topics. 4 cr.

****497/497W. Explorations in Historical Perspectives**
Seminar for freshmen and sophomores. In-depth exploration of a particular historical question or topic: for example, the French Revolution, Chaucer's England, or the New Deal. Students should consult with the Department of History for a list of topics and instructors. 497W is writing intensive. 4 cr.

500. Introduction to Historical Thinking
Basic skills essential to the study of history: critical reading of historical literature, improvement of written and oral analysis of historical material, and use of library resources. Intensive study of books and documents from varying historical fields and periods. Required of history majors; open to other interested students. 4 cr.

595, 596. Explorations in History
See department listings for semester topic. 1–4 cr.

600. Advanced Explorations in History
See department listings for semester topic. Barring duplication of subject, may be repeated for credit. 1–4 cr.

665. Themes in Women's History
In-depth examination of a selected topic in women's history. Topics may include Women and Health, Women in Modern European Political Theory, Comparative History of Women and Revolution. See Time and Room Schedule or history department newsletter for the specific topic. May be repeated for credit with permission of instructor. 4 cr.

#670. Historical Thinking for Teachers
Examines the sources, methods, and interpretive strategies of the historian. Emphasis on texts and topics relevant to the middle- and high-school classroom. Designed for history teachers as well as individuals in the Master of Arts in Teaching (M.A.T.) program. 4 cr.

682. Cults and Charisma
Examines religious sects and charismatic leaders using case studies from history and the contemporary world, as well as analytical principles from religious studies and anthropology. Explores various approaches to the question, what makes a person powerful over others?, in connection with the formation of messianic sects, the genesis of the "cult," the traditional authority of priests and kings, sainthood, the events at Jonestown and Waco, and the popular image of the "cult." Students learn to employ a variety of tools and models to understand historical situations of charismatic leadership. (Also offered as RS 682.) 4 cr.

@690. Introduction to Public History
Introduction to the theory, methodology, and practices of public historians. Examines the history and contemporary practices of historians whose research and scholarship is aimed at public audiences through the creation of diverse media and interpretive frameworks. Encourages interdisciplinary thinking about history. 4 cr. Cr/F.

@695. Independent Study
A) Early American History; B) American National History; C) Canada; D) Latin America; E) Medieval History; F) Early Modern Europe; G) Modern European History; H) Ancient History; I) Far East and India; J) Near East and Africa; K) European Historiography; L) American Historiography; M) Russia; N) World History; O) English History; P) New Hampshire History; Q) Historical Methodology; R) Irish History; S) History of Science; T) Maritime. For students showing a special aptitude in history who desire to study an area or subject for which no appropriate course is offered. Prereq: permission. 4-8 cr.

771. Museum Studies
Introduction to theory, methods, and practice of museum studies. Examination of various museum functions, as well as contemporary historical controversies. 4 cr.

#772. Studies in Regional Material Culture
Designed to acquaint students with artifacts commonly used in New England homes during the period 1750–1860 and to present these artifacts in their contemporary cultural context, including their relationships with designers, clients, patrons, manufacturers, craftsmen, and consumers. 4 cr. (Not offered every year.)

774. Historiography
Analysis of ancient and modern historians. Open to undergraduates with permission. 4 cr. (Not offered every year.)

775. Historical Methods
Contemporary historical methods. Required of all entering Ph.D. candidates; open to undergraduates with permission. 4 cr. (Not offered every year.)

787. Quantitative Methods and Computers for Historians
The historian's use of computers and statistics: opportunities and problems in using and analyzing quantitative sources; elementary statistical techniques; practical applications involving microcomputers and applications programs. No previous knowledge of computers or college mathematics is assumed or required. Prereq: admission as an undergraduate major or graduate student in history; or permission of the instructor. 4 cr. (Not offered every year.)

796. Research Internship
Intensive collaborative experience in research for undergraduate majors. Students will gain professional skills while assisting a faculty member on a continuing research project. Permission required. 2–4 cr.

797. Colloquium in History
Selected topics in American, European, and non-Western history. Required of history majors. Students must select section in the department office at the time of registration. Writing intensive. 4 cr.

799. Senior Thesis
Supervised research leading to the presentation of a major research paper. Open only to history majors. Permission of department chairperson required. May not be used as a substitute for the required senior colloquium. 4 cr.

Hospitality Management (HMGT)

(For program description, see page 98.)

Chairperson: Raymond J. Goodman, Jr.
Professor: Raymond J. Goodman, Jr.
Associate Professors: Joseph F. Durocher, Jr., Emery H. Trowbridge
Assistant Professor: Yae Sock Roh
Part-Time Assistant Professor: Sylvia H. Marple

401. The Hospitality Industry: Historical Perspectives and Distinguished Lecture Series
Review the broad spectrum of the hospitality industry from an historical perspective, in concert with current history, trends, and challenges presented by notable industry executives. Distinguished guests represent all segments of the hospitality industry plus selected allied support businesses. Industry segments include, but are not limited to, hotels and lodging, restaurant and food service, travel and tourism, conferences and conventions, casinos and gaming, clubs and resorts, health care and senior living, franchising and entrepreneurship, and technology support. Writing intensive. 4 cr.

403. Introduction to Food and Beverage Management
Focuses on the basic principles of food and beverage operations management. During weekly laboratory sessions in the New England Center for Continuing Education, students experience both front of the house and back of the house activities. Application of classroom principles further enhanced through industry guests, field trips, participation in gourmet dinner productions, and a class-managed and produced catered function. Prereq: permission. Writing intensive. 4 cr.

554. Lodging Operations Management
Focus on management history, planning, organizing, leadership, and current and future management issues. The course requires students to compare rooms division management in a large hotel with that of a small hotel, including reservations, front office operations and accounting, housekeeping, and auxiliary functions. The complexities and the terminology of the design, management, and maintenance of physical structures used by civil engineers and architects are integral to the course. Guest lecturers include hotel general managers and department heads who highlight student projects. Prereq: HMGT 401 and 403. 4 cr.

567. Food and Beverage Operations Management
Integration of operations management principles and techniques. Presentation of large-scale gourmet dinners; act as managerial consultants to on-campus food service facilities. The lab provides an experiential setting for the application of such principles as marketing, operations management, accounting and organizational behavior through the planning, organizing, coordinating, and execution of weekend food service events. Prereq: HMGT 403. Lab. 4 cr.

595. Internship I
A nontraditional academic experience relating to work experience within the University system. Coordinated by a faculty member who provides supervision, along with an on-site supervisor, through regular class meetings. Includes academic assignments and a written report. May be repeated to a maximum of 12 credits. Prereq: permission and good academic standing. 1–12 cr. Cr/F.

600. Hospitality Marketing Management
Students apply basic marketing principles to the competitive environment of service businesses, such as hotels, restaurants, and other hospitality firms. Strong emphasis on consumer behavior, services management theory, and the hospitality marketing mix as they relate to service firms of all types. Course material is presented through a variety of techniques: case studies, lectures, guest speakers, team projects, and written assignments. No credit for students who have had MKTG 651. Writing intensive. 4 cr.

603. Service Industries Management
Provides broad understanding of managerial issues in the operation of service firms, as distinct from consumer product or manufacturing firms, e.g., lodging, restaurants, health care, banking, and education. Examines, from the viewpoint of the service firm manager, the role services play in the economy, delivery systems, encounters, technology, human resources, productivity, and quality issues, along with the concept of service. 4 cr.

618. Uniform Systems for the Hospitality Industry
Following a review of financial statements and an introduction to the Uniform System of Accounts for Hotel and Restaurants, students learn specific applications of managerial accounting and decision support systems for the hospitality industry. Topics include cash flow analysis, cost management, cost-volume-profit analysis, pricing models, budgeting, and forecasting. Students develop an understanding of course topics as they relate specifically to the hospitality industry through lectures, computer exercises, and papers. Prereq: ACFI 502; 503. 4 cr.

625. Hospitality Law
Tort and contract liability in the hospitality industry. Emphasis on a managerial approach to solving or avoiding potential problems while managing a business. 2 cr.

627. Employment Law
Employment law issues that arise in any business environment. Covers employee wrongful termination, compensation rules, affirmative action, employment discrimination, sexual harassment, and issues involving privacy in the workplace. 2 cr.

635. Hospitality Human Resource Management
Addresses key hospitality resource management issues of a general, technical, and social nature including communication, motivation and leadership, job stress and safety, security, government regulations, discrimination, and substance abuse. Covers technical areas such as recruiting and selecting, placement, employment, training, performance appraisal, disciplining, and termination. No credit for students who have had MGT 770. Writing intensive. 4 cr.

655. Hospitality Finance and Development
Provides the advanced student with a familiarity of the principles and practices of development and acquisition of hotel, restaurant, and other hospitality businesses, and the real estate development process. Emphasis on market and financial evaluation and decision making relative to economic, ethical, legal, and social aspects of the organization's environment. Group projects involving the preparation of a complete economic feasibility study for hotel or restaurant development or acquisition or repositioning are required. Prereq: HMGT 618. 4 cr.

#661. Meetings and Conventions
Strategic and logistical considerations in managing the planning, development, marketing, and implementation of meetings, conferences, and conventions. Prereq: permission. 4 cr.

685–686. Study Abroad
Open to students studying abroad in the discipline as approved by the hospitality management program director. 1–16 cr. Cr/F.

695. Independent Analysis
Study and research project for honor students to advance knowledge in lodging and food services fields. Prereq: junior standing and permission. 2–16 cr.

696. Supervised Student Teaching Experience
Participants are expected to perform such functions as attending classes, leading discussion groups, assisting faculty, presenting information in undergraduate courses that they have successfully completed, holding office hours, grading papers and exams. Enrollment is limited to juniors and seniors who have above average GPAs. May be repeated to a maximum of 8 cr. Prereq: permission of instructor, program director, and director of advising.1–8 cr. Cr/F.

698. Topics in Hospitality Management
Special topics and developments in lodging, food services, and other hospitality industries. Prereq:

junior standing and permission. Course may be repeated when topics change. 1–4 cr.

703. Strategic Management in the Hospitality Industry
Capstone course, interrelating and applying strategic management concepts to hospitality organizations. Cases from hotel companies, restaurant chains, and other hospitality-related businesses, supplemented by economic and other published information from the industry, are used as departure points for class discussion. Prereq: all Group B courses. Writing intensive. 4 cr.

750. Senior Operations Seminar
Allows students to experience and participate in the planning and decision-making process of a full-service hotel; to contribute to and understand the intricacies of managing change while gaining a sensitivity to interdepartmental coordination. Class meets at major metropolitan hotels. Prereq: permission. 4 cr.

756. Hospitality Franchising
Designed to help the student acquire an understanding of franchising as a system of distribution and business expansion. Franchising will be studied from both the perspectives of the franchisee and the franchisor. In addition, economic, financial, and legal issues associated with franchising will be covered. By the end of the course, students will acquire the skills and sources of information that would permit sound assessment of the business opportunities available in franchising. Prereq: MKGT 651 or HMGT 600. (Also offered as MKTG 756.) 4 cr.

761. Hospitality Design
Design principles and components for front and back of the house hospitality environments will be presented and applied to case studies and class projects. 4 cr.

771. Beverage Management
Examination of purchasing, evaluation, storage, service, and control of alcoholic beverages. Emphasis on wines, although beer, ale, distilled spirits, liqueurs, and mixed drinks are examined. Prereq: permission. 4 cr.

772. Senior Living Industries Management
Designed for hospitality majors, gerontology interdisciplinary minors, and any other students interested in studying the demographic realities leading to career and business opportunities in a wide range of disciplines as relates to aging Americans and mature adults worldwide. A significant element of this course will address issues in retirement facilities management as well as to introduce students to the fastest growing market segment in the developed countries of the world for whom products and services are being created, designed, and managed. 4 cr.

777. Casino Management
History, development and management of casinos and gaming. Emphasis on environment, operations, regulation, accounting, auditing and taxation of casinos and gaming. Investigates the economics, moral and cultural issues of gaming. Prereq: permission. 4 cr.

795. Internship II
Off-campus work in the hospitality industry for on-the-job skill development. Normally supervision is provided by a qualified individual in the organization with frequent consultation by a hotel program faculty sponsor. A written report is required of the student. Internships may be part-time or full-time, with course credits assigned accordingly. May be repeated to a maximum of 12 credits.Prereq: permission and good academic standing; junior and senior students only. 1–12 cr. Cr/F.

799. Honors Thesis/Project
Supervised research leading to the completion of an honors thesis or project; required for graduation from the honors program in hospitality management. Prereq: permission of director of undergraduate programs and department chair. 4–8 cr.

Humanities (HUMA)

(For program description, see page 40.)

Coordinator, Humanities Program: David M. Richman
Associate Coordinator, Humanities Program: Georgann Murphy
Core Faculty: David S. Andrew, Art and Art History; Donna B. Brown, Humanities; Warren R. Brown, Political Science; Thomas A. Carnicelli, English; Patricia A. Emison, Art and Art History; Michael K. Ferber, English; Jan V. Golinski, History; Ronald D. LeBlanc, Languages, Literatures, and Cultures; Gregory McMahon, History; Robert M. Mennel, History; Georgann Murphy, Humanities; David M. Richman, Theatre; Peter W. Urquhart, Music; Charlotte Elizabeth Witt, Philosophy.

401. Introduction to the Humanities
Introduction to the interdisciplinary study of the humanities. Taking as its entry point a significant work, the course is organized by topics related to that work, selected and arranged to invoke lively intellectual debate among faculty and students alike. Group lectures by the four core humanities faculty members. The instructors teaching the course will provide material for smaller weekly discussion sections led by each of those faculty members. Requirements include lively discussions, papers, and examinations. Writing intensive. 4 cr.

#480. What a Text Can Teach
Students examine selected classic texts in the humanities with faculty members representing the arts, music, literature, and philosophy. Through three modules and a team-taught symposium, students investigate how each of these forms of expression contributes to human knowledge and to an understanding of the human being. Not for HUMA major credit. Writing intensive. 4 cr.

500. Critical Methods in the Humanities
Critical analysis of works in the humanities. Focuses on major texts, evaluation of secondary literature, research writing, criticism. Required of all HUMA majors. Writing intensive. 4 cr.

501. Humanities: The Ancient World
Students develop an appreciation of the roots of Western civilization through the study of ancient art, literature, and philosophy, including Homer, Greek tragedy, Plato, Aristotle, the Bible, Vergil. Weekly lecture series, slides, films. Special fee. 4 cr.

502. Humanities: The Modern World
Contributions to human knowledge and culture from the Early Renaissance through the Enlightenment examined through literature, philosophy, and art. Students study Dante, Castiglione, Machiavelli, Montaigne, Racine, Molière, Pope, Goethe, Wordsworth, Zola, Tolstoy, and examples of art and architecture. Weekly lecture series, slides, films. Special fee. 4 cr.

#503. Humanities: The 20th Century
Students gain insight into the nature of contemporary Western civilization through selected examples of literature, philosophy, psychology, and art. Students study and discuss works by writers and artists such as Kafka, Mann, Hesse, D.H. Lawrence, Sartre, C.G. Jung, Picasso, Chagall, di Chirico, Beckett, Mishima, Lillian Smith, Weizenbaum, Weil. 4 cr.

Students enrolling in HUMA 510, 511, 512, or 513 must designate a discussion section in only one of four fields—arts, English, history, or philosophy—corresponding to and satisfying one of four general education categories. To satisfy the general education requirement in fine arts, students should register for 510A, 511A, 512A, 513A, or 515A; in works of literature and ideas, 510B, 511B, 512B, 513B, or 515B; in historical perspectives, 510C, 511C, 512C, 513C, or 515C; in philosophical perspectives, 510D, 511D, 512D, 513D, or 515D. For students who complete the entire sequence of HUMA 510, 511, 512, and 513, enrolling in different discussion sections each time, a fifth general education requirement (in foreign culture) will be waived, although additional credit hours will not be granted. The following Humanities sections are writing intensive: HUMA 510A, 510B, 510C, 510D, 511A, 511B, 511C, 511D, 512A, 512B, 512C, 512D, 513A, 513B, 513C, 513D.

510. Chance, Necessity, and Reason: The Search for the Good Life
What is a human being? How should we explain or understand what happens to us? How ought we to live? This team-taught course examines these important questions by focusing on the literature, art, philosophy, and science of ancient Greece. 4 cr.

511. Fortune, Sin, and Faith: The Search for the Spiritual Life
What is the soul and how is its health related to temptation and also to specifically Christian virtues? How closely does the medieval definition of an eternal God determine good and evil in daily life? To what extent does the hope of immortality affect the practice of writing literature, making art, studying philosophy, and investigating science? This team-taught course examines these important questions by focusing on the literature, art, philosophy, and science from the collapse of the classical world to the rise of capitalism. 4 cr.

#512. Reason, Doubt, and Experience: The Search for the Enlightened Life
Exploration of the interrelationships of art, literature, philosophy, and science from the High Renaissance into the 18th century. Study of the

works and ideas of such influential figures as Shakespeare and Milton, Raphael and Rembrandt, Galileo, Descartes, Newton, and Hume. Special attention to the following: (1) classical roots of modern imagination; (2) God in the world of the scientific revolution; (3) the uncertain relationship between experience and reality. 4 cr.

513. History, Mind, and the Absurd: The Search for the Meaningful Life
Explores the central paradoxes of our culture in the modern age. Is there such a thing as "progress" and if so what is its nature? What is the relation of conscious and unconscious? Is the contemporary world devoid of meaning? These three questions are examined in literature from Goethe's Faust to Samuel Beckett, in the history of science from Darwin to Freud and contemporary chaos theory, in philosophy from Hegel and Marx to Nietzsche and Foucault, and in art from Picasso and Le Corbusier to postmodern architecture. 4 cr.

515. The Twentieth Century, Part II: 1945–1999
Interdisciplinary introduction to the humanities from World War II to the present emphasizing such historical, literary, philosophical, and artistic developments as the Holocaust, the atom bomb, existentialism, theatre of the absurd, structural linguistics, abstract expressionism, pop art, and postmodern architecture. This team-taught course combines lectures with weekly discussion groups to encourage informed appraisal of the century in which we have lived. 4 cr.

#607. The American Character: Religion in American Life and Thought
Interdisciplinary study of the American religious experience and its relationship to other aspects of American culture, taught by a team of three specialists, each in a different discipline: American intellectual and cultural history, American literature, and American church history. Central emphasis on several transforming themes of the 19th century and their effects upon the interplay of religion and society. (Also offered as ENGL 607, HIST 607, and RS 607.) Writing intensive. 4 cr.

608. Arts and American Society: Women Writers and Artists, 1850–Present
Team-taught course studying the impact of gender definitions on the lives and works of selected American artists. Considers lesser-known figures such as Fannie Fern, Lilly Martin Spencer, and Mary Hallock Foote as well as better-known artists such as Willa Cather and Georgia O'Keeffe. Prereq: permission or one of the following: WS 401, HIST 566, ENGL 585 or 586, ENGL 685 or 785, or a 600-level art history course. (Also offered as ARTS 608, ENGL 608, and HIST 608.) Writing intensive. 4 cr.

#609. Ethnicity in America: The Black Experience in the Twentieth Century
Team-taught course investigating music, literature, and social history of black America in the period of the Harlem Renaissance, in the Great Depression, World War II, and in the 1960s. Special attention to the theme of accommodation with, and rejection of, dominant white culture. (Also offered as ENGL 609 and MUSI 609.) Writing intensive. 4 cr.

#610. Regional Studies in America: New England Culture in Changing Times
Team-taught course investigating some of the major contributions New England has made to American life. Focusing on three periods: the Puritan era, 1620–90; the Transcendental period, 1830–60; and the period of emerging industrialism in the late 19th century. Prereq: second-semester sophomore. (Also offered as HIST 610, ENGL 610, and ARTS 610.) Not for art studio major credit. Writing intensive. 4 cr.

650. Humanities and the Law: The Problem of Justice in Western Civilization
Interdisciplinary modular course examines interpretations of the nature of justice, its origins, the role of the professional judiciary, and the relationship of law and ethics. Students take three successive five-week modules during the semester. Writing intensive. 4 cr. (Not offered every year.)

651. Humanities and Science: The Nature of Scientific Creativity
Interdisciplinary modular course examines the historical and intellectual foundations of the physical, biological, and human sciences. Students take three successive five-week modules during the semester. Writing intensive. 4 cr. (Not offered every year.)

698. Independent Study in the Humanities
Independent study open only to highly qualified juniors and seniors who have completed at least four humanities courses above the 400 level. Requires original research and substantial writing projects under direction of a member of the core faculty of the humanities. Prereq: HUMA junior or senior majors; four HUMA courses above the 400 level. 4 cr.

700. Seminar in the Humanities
Provides an opportunity for in-depth reading, viewing, and/or listening to texts and artifacts. Emphasis on the multiple perspectives and methodologies that can be brought to bear upon these works from several humanistic disciplines. Writing intensive. 4 cr.

730. Special Studies in the Humanities
Selected topics not covered by existing courses, with subjects to vary. May be repeated for credit. Prereq: one 400- or 500-level HUMA course or junior standing. Writing intensive. 4 cr.

798. Research Seminar in the Humanities
Provides a context within which students may discuss and receive direction in the course of completing a major research paper. At the end of the seminar, students present their research to the faculty and their fellow students. Prereq: senior standing; permission. Writing intensive. 1 cr.

799. Research Seminar in the Humanities
Provides a context within which students may discuss and receive direction in the course of completing a major research paper. At the end of the seminar, students present their research to the faculty and their fellow students. Restricted to majors. Prereq: HUMA 798; senior standing; permission. Writing intensive. 3 cr.

Hydrology

(For program description, see pages 51, 60; for courses, see Earth Sciences.)

Coordinator: S. Lawrence Dingman

Intercollege Courses (INCO)

401. War
Nature and experience of modern warfare and its historical development; social and biological roots of war; national security and defense concepts and issues; the nuclear age and weapons of mass destruction; the post-Cold War age; philosophical issues. 4 cr.

402. Peace
Investigates (1) military deterrence in theory and practice; (2) alternatives to military deterrence such as diplomacy, international law, conflict resolution, and nonviolent defense; (3) economic and environmental interdependence of nations; and (4) political, cultural, ethical, and religious conceptions of peace. 4 cr.

404. Honors: Freshman Seminar
Introductory course required of all honors program students. A general education course with sections offered in all general education groups except Groups 1 and 2. Writing intensive. Special fee. The following sections of INCO 404 are writing intensive: 404B, 404C, 404D, 404E, 404F, 404G, 404H, 404J, 404K, 404L, 404M, 404N, 404O, 404P, 404R, 404S, 404T, 404U, 404W. 4 cr.

450. Introduction to Race, Culture, and Power
Explores the ways in which the concept of "race" serves to justify global relationships of domination and inequality and is embedded in U.S. society. Examines how dominant powers use "culture" to maintain subordination and how subordinated peoples use "culture" to resist exploitation. 4 cr.

480. Art in Society
Brings students into relationship with classical visual and performing arts. Students attend lectures about the arts and live performances of music, theatre, and dance; take trips to visit museums; and view architecture. Students read relevant materials and write about each art work experienced. Special fee. 4 cr.

#506. Internship
Based on appropriate career-oriented work experience found with the aid of Career Services' Job Locator Program or with established national/international internship programs, or preprofessional jobs initiated by the student. Prereq: permission; for A.A. degree students only; contact Career Services. 1–4 cr. Cr/F.

585, 586. Foreign Exchange
Juniors and seniors may spend a semester or year in Canada at one of eleven colleges and universities in Nova Scotia or one of eighteen participating institutions in Quebec. Possible disciplines include public relations, hospitality management, and computer science. Eligibility requirements include U.S. citizenship, junior or senior standing, and

good academic achievement. For more information contact the Center for International Education.

#595. Winterim Topics
Concentrated interdisciplinary exposure to a particular culture or locale off campus during the winter term. Includes anthropological, artistic, biological, cultural, environmental, or geographical, historical, political, sociological, and other aspects of a culture, country, or locale. May be repeated to a maximum of 8 credits. 1–4 cr.

#596. Summer Topics
Provides a concentrated interdisciplinary exposure to a particular culture or locale off campus during the summer session. Includes anthropological, artistic, biological, cultural, environmental, geographical, historical, political, sociological, and other aspects of a culture, country or locale. May be repeated to 8 credits. 1–4 cr.

604H. Honors Senior Thesis
Final requirement for graduation with University Honors. Intended for honors students in majors that do not offer honors work. Open by special permission to other honors students. May be repeated for a maximum of 8 credits. 4 cr. IA.

655–656. London Program
Enables students to pursue a semester or academic year of study in UNH's program in London, England. Students must be admitted into the London program before enrolling in the course. For information and application forms, consult the program secretary, 53 Hamilton Smith Hall. Special fee. Variable to 18 cr. Cr/F. (IA grade will be assigned until official transcript is received.)

657. Budapest University of Economic Sciences Exchange Program
Coordinated through the Institute for Policy and Social Science Research, this program is designed for students studying in the social sciences or related disciplines who wish to study abroad. The program is conducted each fall in Budapest, Hungary. The English language courses offered transfer as general education, major, or elective credit within the departments of sociology, economics, political science, history, tourism, communication, and other social sciences. Students accompanied by a UNH professor. Prereq: first-year student. Special fee. 0–16 cr.

685, 686. Study Abroad
Enables students to pursue a semester, summer, or an academic year of foreign study in programs other than those offered by UNH. Students must provide the University Committee on Study Abroad with detailed information about the curriculum and must receive approval from that committee before registration. Credit awarded only upon successful completion of the course of study and after receipt by the committee of an official transcript. Interested students should consult the Center for International Education. Prereq: permission. Special fee. (Financial aid requires a minimum of 6 credits.) Variable to 16 credits. Cr/F.

#698. Summer Research Project
Guided independent research or student/faculty collaborative research. Open to recipients of summer undergraduate research fellowships or by permission of the Undergraduate Research Opportunities Program. 0–8 cr. (Summer only.)

International Affairs (IA)

Center for International Education
(For program description, see page 101.)

401. International Perspectives: Science, Business, and Politics
Examination of the interaction of developments in science, economics, and politics as they shape international affairs. Topics include science and technology; world trade and investment; politics, cultural values, and ethics in world affairs. Team-taught, modular course. Prereq: permission; IA major. Writing intensive. 4 cr.

501. Global Issues in International Affairs
Introduce students to the various relationships among peoples, states, and cultures within a global environment. While built upon the general knowledge acquired in IA 401, IA 501 provides a more in-depth study of particular issues involving a variety of regions of the globe. This course is essential to preparing students for study abroad and to equipping them to conceptualize suitable research topics for IA 701. Each student will be expected to put substantial time into developing the reading, research, and analytical skills necessary for the study of international affairs. Prereq: IA 401. Writing intensive. 4 cr.

520. World Scientific Cultures
Introduction to global issues and international dimensions of science and technology through study of history, sociology, and politics of science. Lecture/lab. 4 cr. IA.

#599. Special Topics
Subjects vary. Course descriptions are available at the Center for International Education. Some semesters, this course will satisfy specific requirements for the dual major in international affairs. For specific information in a particular semester, contact the Center for International Education. 4 cr.

685–686. Foreign Experience
Dual majors will register for IA 685-686 for foreign experience situations not covered by the foreign language departments' Study Abroad (685-686). Most commonly the foreign experience consists of study in a non–English-speaking country for a year, a semester, or a summer (eight weeks). It should be in a country where the language spoken is the one the student presents to satisfy his/her foreign language requirement. The University Committee on International Studies will consider exceptions to this rule upon petition explaining reasons for the alternative experience. Prereq: permission. Special fee. Variable transfer credit. (Financial aid requires a minimum of 6 cr.) Cr/F.

695. Internships in International Affairs
Designed to provide research and work opportunities with an international aspect to UNH undergraduates. Internships may involve either research with a faculty member or work with an employer. Prereq: permission. Variable credit of 2–4 credits. May be repeated up to 8 credit hours. Cr/F.

#699. Topics in International Affairs
Special topics course with varying subject matter and format. Study of areas and subjects not covered by existing courses. Center for International Education provides information on current offerings. Recommended as a dual major elective. 4 cr.

701. Seminar in International Affairs
Capstone of the dual major in international affairs. To be taken after completion of the foreign language and foreign experience requirements. Strong emphasis on research and analysis, use of foreign language skills, writing, and criticism. Prereq: IA 501; IA major. Writing intensive. 4 cr.

Italian (ITAL)

Department of Languages, Literatures, and Cultures
(See department note, page 31; faculty listing, page 178.)

New students will be assigned to the proper course upon consultation with the section coordinator. Students educated in Italian-speaking countries may not register for courses below the 700 level. No UNH or transfer credit will be given for elementary-level college courses in Italian if students have had two or more years of Italian in secondary school.

The minor in Italian consists of five courses beyond the 401-402 sequence. These courses may include ITAL 503, 504, 631, 651, 652, 795, 796, or one course taught in English in a related field. The minor provides a thorough study of grammar, critical reading and writing, and an introduction to Italian culture and civilization.

401–402. Elementary Italian
For students without previous training in Italian. Aural comprehension, speaking, writing, reading. Labs. (No credit for students who have had two or more years of Italian in secondary school; however, any such students whose studies of Italian have been interrupted for seven years should consult the section coordinator about possibly receiving credit.) Special fee. 4 cr.

425. Introduction to Italian Studies
Designed for students interested in exploring Italian language and culture. Culture learning by means of guest speakers and visuals. Prepares for ITAL 401-402. Taught in English. Does not satisfy foreign-language proficiency requirement. (Also offered as WLCE 425I.) Special fee. Writing intensive. 4 cr. (Offered summers only. Not offered every summer.)

500. Selected Topics in World Literature
Topics will be chosen which introduce students to major themes and genres. (Also offered as CLAS 500, FREN 500, GERM 500, PORT 500, RUSS 500, SPAN 500, WLCE 500.) May be repeated for credit. Writing intensive. 4 cr. Cr/F.

503–504. Intermediate Italian
A complete review of the fundamentals of grammar and syntax. Selected readings as a general introduction to Italian civilization and culture. Labs and films. Special fee. 4 cr.

521. Italian Literature in Translation, 13th–16th Centuries
Major works of fiction and nonfiction, reflecting ideas and taste during the first three centuries of Italian history. Readings, discussions, papers in English. No more than one course in English may be counted toward the minor. (Also offered as

WLCE 521I.) Writing intensive. Special fee. 4 cr. (Not offered every year.)

522. Italian Literature in Translation, 18th–20th Centuries
Major trends in post–Renaissance thought and culture in Italy. Readings, discussions, papers in English. No more than one course in English may be counted toward the minor. (Also offered as WLCE 522I.) Writing intensive. Special fee. 4 cr. (Not offered every year.)

595. Italian Practicum
Practical use of Italian language and culture through special projects outside the classroom. May be repeated for a maximum of 4 credits. Prereq: permission. 2 cr. Cr/F

631. Advanced Italian Conversation and Composition
Rapid review of basic grammatical structures and in-depth study of more complex linguistic patterns. Vocabulary building. Frequent written compositions and oral presentations using materials on contemporary culture taken from the various media. Phonetics and oral/aural skills development in lab and class. Prereq: C or better in ITAL 504 or permission. Special fee. Writing intensive. 4 cr.

651. Introduction to Italian Culture and Civilization I: Middle Ages, Renaissance, Baroque
Survey of major representative writers and artists, studied against the backdrop of social and cultural history. Dante, Petrarch, Boccaccio, Machiavelli, Marino. Pre- or coreq: ITAL 631 or permission. Special fee. Writing intensive. 4 cr. (Not offered every year.)

652. Introduction to Italian Culture and Civilization II: Age of Enlightenment, Romanticism, Modernism
Survey of major representative writers and artists, studied against the backdrop of social and cultural history. Parini, Goldoni, Leopardi, Manzoni, Pavese, Calvino. Pre- or coreq: ITAL 631 or permission. Special fee. Writing intensive. 4 cr. (Not offered every year.)

795, 796. Independent Study in Italian Language and Literature
Individual guided study. Prereq: permission. 1–4 cr. (Not offered every semester.)

Japanese (JPN)

Department of Languages, Literatures, and Cultures
(See department note, page 31; faculty listing, page 178.)

New students will be assigned to the proper course on the basis of an achievement test. Transfer credit will not be given for elementary-level college courses in foreign language if a student has had two or more years of the foreign language in secondary school.

401–402. Elementary Japanese
Elements of Japanese grammar. Oral practice and written drills designed to achieve a mastery of basic grammatical patterns. Reading of graded exercises introducing the student to written Japanese (Hiragana and Katakana) and Chinese characters used in contemporary Japan. Labs. (No credit for students who have had two or more years of Japanese in secondary school; however, any such students whose studies of Japanese have been interrupted for a significant period of time should consult the department chairperson about possibly receiving credit.) Special fee. 4 cr.

425. Introduction to Japanese Culture and Civilization
Taught in English and designed for students interested in exploring Japanese culture, society, and literature. Learning by means of lectures, discussions, selected readings, and multimedia. Offered spring semesters and some summers. Does not fulfill B.A. foreign language requirement, but does fulfill the Group 5 foreign culture general education requirement. (Also offered as WLCE 425J.) Special fee. 4 cr.

503–504. Intermediate Japanese
Review of Japanese grammar. Reading of prose and practice in oral and written expression. Labs. Prereq: JPN 402 with a grade of C (2.00) or better or permission of instructor. Special fee. 4 cr.

#631–632. Advanced Japanese
Advanced spoken and written Japanese to attain aural-oral fluency. Advanced reading and composition. Prereq: JPN 504 or permission of instructor. Special fee. 4 cr.

795, 796. Independent Study in Japanese
Open to highly qualified juniors and seniors. To be elected only with the permission of department chairperson and of the supervising faculty member or members. Barring duplication of subject, may be repeated for credit. 1–4 cr.

Justice Studies (JUST)

(For program description, see page 29.)

601. Field Experience in Justice Studies
Placement by the justice studies coordinator in a position related to the justice system (e.g., criminal courts, corrections, civil courts, law firms, policy-making agencies, law enforcement agencies); weekly class meetings. Prereq: permission; seniors only. 4 cr. Cr/F.

Kinesiology (KIN)

(For program description, see page 70.)

Chairperson: Ronald V. Croce
Professors: Ronald V. Croce, Michael A. Gass, Stephen H. Hardy, Robert Kertzer
Associate Professors: Heather Barber, John P. Miller, Timothy J. Quinn, Neil B. Vroman
Assistant Professors: Thomas W. Ashwell, Thomas R. Barstow, Benedict P. Dyson, Daniel E. Garvey, Robert W. Kenefick, Starla McCollum, Daniel R. Sedory, Deborah A. Sugerman
Instructors: Kathryn L. Doherty, Karen N. Henny, Kenneth T. Hult

Adjunct Faculty from the Departments of Intercollegiate Athletics:

Adjunct Lecturers: James H. Boulanger, M. William Bowes, Edmund Datti

The Major Program

Prospective kinesiology majors should refer to page 70 for information regarding the major programs.

Program Fees

Fees are charged for off-campus activities such as backpacking, canoeing, ice climbing, rock climbing, and for courses that use special equipment. Students with physical limitations are encouraged to participate in the program on a modified basis. KIN 410 may be repeated once for credit. For specific course requirements, prerequisites, and fees, consult the department chairperson.

410. Cardiopulmonary Resuscitation
Appropriate actions for survival from cardiac arrest and foreign body airway obstruction. Recognition of the early warning signs of cardiovascular disease. Leads to certification by the American Heart Association. Special fee. 0.5 cr. Cr/F.

#521. Theory of Coaching Basketball
Individual and team offense and defense; rules of the game. Problems in team handling and conditioning. Prereq: permission. 2 cr.

522. Theory of Coaching Football
Systems of play; team and individual offensive and defensive fundamentals; theory and strategy of team play; coaching methods, physical conditioning; rules. 2 cr.

#523. Theory of Coaching Hockey
Basic hockey skills. Fundamentals of individual and team offense and defense; coaching methods; rules. Prereq: students must have basic skating skills prior to taking course. 2 cr.

#524. Theory of Coaching Baseball
Batting and fielding; fundamentals of each position; problems of team play; coaching methods; physical conditioning; rules. Prereq: permission. 2 cr.

525. Theory of Coaching Soccer
Fundamental and advanced skills and techniques; offensive and defensive principles of team play; tactical formations and strategy; methods of training and practicing; rules. Prereq: permission. 2 cr.

#526. Theory of Coaching Wrestling
Theory, practical teaching methods, and the development of skills and techniques from basic maneuvers to the more advanced. 2 cr.

527. Scientific Foundations of Health and Fitness
Designed to provide students with practical, scientific, entry-level information relative to physical conditioning, health, and wellness from childhood through adulthood. Students will be given theoretical information which will be followed by practical, hands-on experiences offered through laboratory experiences. Special fee. 4 cr.

528. Theory of Coaching Track and Field
Starting, sprinting, middle-distance and distance running, relay, hurdling, high and broad jumping, pole vault, shot putting, discus, hammer, and javelin. Methods of training and practicing. Prereq: permission. 2 cr.

#529. Theory of Coaching Gymnastics
Theory, practical teaching methods, and officiating. Construction of gymnastic routines, from elementary to international level. Prereq: permission. 2 cr.

#530. Theory of Coaching Swimming and Diving
Philosophy, historical development, and psychological theories of coaching. Mechanical and kinesiological aspects of the competitive strokes and required optional dives, low and high board. 2 cr.

#531. Theory of Coaching Field Hockey
Analysis of field hockey coaching techniques. New systems of play; use of interval training for preseason conditioning and in-season practices. Prereq: permission. 2 cr.

#532. Theory of Coaching Racquet Sports
Thorough and in-depth knowledge of the administration and coaching of major racquet sports: badminton, racquetball, squash, and tennis. Prereq: permission. 2 cr.

533. Basic Scuba
Full semester in the fundamentals of scuba diving. Through a progressive series of classroom lectures and pool sessions, the students will gain the knowledge and skills necessary to conduct themselves with competence underwater. A high emphasis is placed on safety and problem prevention. Once the students are ready, further training takes place in an open ocean environment. NAUI Certification for successful completion of all course requirements and at least five open-water dives. Strong swimming ability required. Special Fee. Lab. 3 cr. Cr/F.

560. Psychology of Sport
Introduction to the discipline of sport psychology. Explores behavioral, cognitive, and social psychology in relation to elite, collegiate, and high school athletes, as well as recreational sport participants. 4 cr.

585. Emergency First Responder
Standards of practice that conform to the content of the U.S. Department of Transportation curriculum for First Responder. Initial evaluation and stabilization of patients at the scene of medical emergencies; CPR; and other basic medical care for illness and injury. Prepares the student for the New Hampshire First Responder Certification Examination. Prereq: KIN: Athletic Training.; KIN: Exercise Science; HHS undeclared. Lab. Special fee. 4 cr.

607. Biology of Aging
Biological mechanisms of the aging process, with special emphasis on human aging; changes due to chronic disease. 4 cr.

650. Internship
Experiential learning in a setting appropriate to the major option and to student's objectives. An 8-cr. internship will require a minimum of 600 hours of experience; fewer credits will require proportionally fewer hours. Prereq: junior/senior major; permission. 2–12 cr. Cr/F.

A) Exercise Science. In an agency that offers physical activity programs of prevention, intervention, and rehabilitation. Activities include graded exercise testing, prescription, and leadership. Must have completed all requirements for the option. 8 cr. Cr/F.

B) Outdoor Education. Provides an appropriate transition from undergraduate education and future employment in the field of outdoor education. Generally done after students have completed all other requirements for the option. 2–8 cr. Cr/F.

C) Sport Studies. May be on- or off-campus with an approved organization. Student must participate in securing the internship. A journal, biweekly reports and a final paper required. May be repeated for a maximum of 12 credits. 2–8 cr./semester.

652. Clinical Kinesiology
The science of human movement from biomechanical, neuromuscular, and anatomical perspectives; human muscular, joint, and connective tissue anatomy; and actions of skeletal muscles are detailed. Prereq: HHS major; ZOOL 507-508. Coreq: KIN 653A or 653B. 3 cr.

653A. Musculoskeletal Assessment
Principles and methodology of joint range of motion, body mechanics, and muscle strength evaluation. Uses muscle palpation, goniometry, manual muscle testing, hand-held dynamometry, electromyography, and human prosections to facilitate understanding of musculoskeletal anatomy and assessment. Special fee. Prereq: ZOOL 507-508. Coreq: KIN 652. 2 cr.

653B. Biomechanical Analysis of Movement
Principles and methodology of analyzing posture and movement. Uses muscle palpation and testing, electromyography, and cinematography to facilitate students' understanding of movement analysis. Special fee. Prereq: ZOOL 507-508. Coreq: KIN 652. 2 cr.

684. Emergency Medical Care: Principles and Practices
Based on the curriculum established by the U.S. Department of Transportation for Emergency Medical Technician (EMT-Basic), and authorized by the State of New Hampshire-Bureau of Emergency Medical Services (EMS). Topics covered include trauma; medical, environmental and psychiatric emergencies; childbirth; hazardous materials; and infection control procedures. Students participate in clinical observations in one of the region's hospital emergency departments. Students have the option to take the State of NH-EMS Practical Examination and the National Registry Written Examination for EMT-Basics. Passage of both these examinations will lead to national certification as an EMT-Basic. Prereq: department approval. Coreq: KIN 685. 3 cr.

685. Emergency Medical Care: Principles and Practices Lab
Basic emergency health care, including trauma patients, medical and environmental emergencies, and childbirth. Includes clinical experience with a local hospital and ambulance service. Prepares the student for the National Registry of EMTs Examination. Coreq: KIN 684. Prereq: department approval. Special fee. 2 cr.

693. Teaching Assistantship
B) Exercise Leader; C) Outdoor Education; D) Science Labs; E) Cardiac Rehabilitation. Students serve as teaching assistants in assigned class activities. Assignments to be made by the class instructor may include teaching assistants' and administrative duties. May take two different sections. Prereq: department approval. (Max. 4 cr.) 2 cr. Cr/F.

696. Independent Study
An advanced, individual scholarly project under the direct supervision of a faculty member. Prereq: junior or senior; department approval. 2–4 cr. to a maximum of 8 cr.

699H. Honors Project
Project first involves tutorial sessions to introduce the student to the experimental design, after which a research question is developed. After an appropriate literature review, the student collects and analyzes data, forms conclusions, and prepares a written report on the findings. 4 cr.

700. Applied Statistics
Statistical procedures and associated elements of basic research design with direct, practical application to areas within physical education and other health disciplines. Prereq: KIN 504 or equivalent. 4 cr.

706. Neurology
Development, morphology, internal configuration, physiology, histology, function, and pathology of the human nervous system. Prereq: ZOOL 507-508 or equivalent. Coreq: KIN 707. Special fee. 4 cr.

707. Neurology Lab
Basic histology, neuroanatomy and neurophysiology of the human nervous system. Use of brain specimens, videos and pathology case studies to elucidate cell structure, sensory and motor systems, and spinal cord, brainstem and cortical organization and anatomy. Prereq: ZOOL 507-508 or equivalent. Coreq: KIN 706. 1 cr. Cr/F.

735. Advanced Scuba
Classroom, pool, and open-water "hands-on" application in advanced diving techniques. The student's diving ability will progress to become safer and highly educated in a variety of diving disciplines. Topics covered are: navigation, search and recovery, low visibility/night diving, surface supplied diving, ice diving, boat diving, accident management hyperbaric medicine, and physiology and scientific research methods for divers. Special fee. Lab. 4 cr.

#760. Application of Research to Teaching and Coaching
Pertinent research findings in sport psychology, sport sociology, exercise physiology, biomechanics and kinesiology, and motor learning and development. Prereq: KIN 504 or equivalent; permission. 4 cr.

798. Special Topics
New or specialized courses not normally covered in regular course offerings. May be repeated up to 8 cr. Prereq: department approval. 1–4 cr.

Athletic Training

506. Concepts of Athletic Training for the Professional
Introductory course on techniques for prevention, recognition, treatment, and rehabilitation of common athletic injuries. Course is a prerequisite for beginning clinical experience in athletic training rooms for the athletic training professional. Prereq: ZOOL 507. Coreq: KIN 507. 4 cr.

507. Concepts of Athletic Training Lab
Theory and techniques of protective taping and wrapping to prevent common athletic injuries. Techniques of transfer and transportation of injured athletes. Identification of anatomical landmarks. Observation and practice in the University athletic training rooms. Coreq: KIN 506. Special fee. 1 cr.

658. Athletic Training for the Professional I
Factors involved in the care and recognition of athletic injuries. Mechanisms, etiology, and pathology. Clinical signs and symptoms. Techniques for performing appropriate test and assessment procedures. First aid procedures. Emphasizes fractures, soft tissue injury, and the lower extremities. Prereq: KIN 506; ZOOL 507-508. Coreq: KIN 658 LO1. 4 cr.

658 L01. Athletic Training for the Professional I Lab
Techniques and practice for performing test and assessment procedures for athletic injuries. Prereq: KIN 507. Coreq: KIN 658. Writing intensive. 1 cr.

659. Athletic Training for the Professional II
Factors involved in the care and recognition of athletic injuries. Mechanisms, etiology, and pathology. Clinical signs and symptoms. Techniques for performing appropriate test and assessment procedures. First aid procedures. Emphasizes upper extremities, head, and trunk. Prereq: KIN 506; ZOOL 507-508. Coreq: KIN 659 LO1. 4 cr.

659 L01. Athletic Training for the Professional II Lab
Techniques and practice for performing test and assessment procedures for athletic injuries. Prereq: KIN 507. Coreq: KIN 659. 1 cr.

660. Therapeutic Exercise in Athletic Training
Rationale, use, and application of exercise in athletic injury rehabilitation. Basic components of designing and implementing rehab programs. Assessment of physical/injury status. Prereq: KIN 652; 653A. Coreq: KIN 661. 4 cr.

661. Therapeutic Exercise in Athletic Training Laboratory
Students learn and practice psychomotor techniques associated with rehabilitative and conditioning exercise. Coreq: KIN 660. 1 cr.

662. Therapeutic Modalities in Athletic Training
Rationale, use, and application of therapeutic modalities in athletic injury rehabilitation. Principles of electrophysics and biophysics. Physiological effects on body tissues, indications and contraindications, and clinical applications. Prereq: KIN 506; 507. Coreq: KIN 663. 4 cr.

663. Therapeutic Modalities in Athletic Training Laboratory
Students use and practice with the devices, machines, and techniques associated with the treatment and rehabilitation of athletic injuries. Coreq: KIN 662. 1 cr.

665. Laboratory Practicum in Athletic Training
Minimum of 200 hours of experience in N.A.T.A.-approved athletic training clinical sites under the supervision of a N.A.T.A.-certified athletic trainer. 2 cr. Cr/F.

665A, Level I: General athletic training room assignment and/or low-risk sport. Prereq: KIN A.T. majors. 2 cr.

665B, Level II: Assist with moderate- or high-risk sport. Prereq: KIN A.T. majors. 2 cr.

665C, Level III: Assignment to moderate-risk sport as primary student. Prereq: KIN A.T. majors. 2 cr.

665D, Level IV: Assignment to high-risk sport as primary student. Prereq: KIN A.T. majors. 2 cr.

665E, Level V: Off-campus internship. Prereq: KIN A.T. majors. 2 cr.

710. Organization and Administration of Athletic Training Programs
Principles of organization and administration of athletic training programs; management of personnel; legal aspects; relation of athletic trainer to athletic programs and sports medicine team. 4 cr.

715. Seminar in Athletic Training
Career issues and special topics in athletic training. Students required to submit and present a term project on an assigned topic. 4 cr.

718. Career Preparation in Athletic Training
Designed to give students the methods to integrate the knowledge and skills learned in the prerequisite courses into practical applications as the students prepare to graduate. Advanced knowledge and skills will be emphasized in the areas of evaluation, treatment, rehabilitation, and implementation of policies and procedures. Prereq: KIN 658; 659; 660; 662; 710; KIN Athletic Training majors. 4 cr.

Exercise Science

620. Physiology of Exercise
Acute and chronic effects of exercise. Muscle physiology, respiration, cardiac function, circulation, energy metabolism, and application to training. Prereq: ZOOL 507-508. 4 cr.

621. Exercise Laboratory Techniques
Administration of graded exercise tests on treadmill, cycle ergometer, and stepping bench. Monitoring physiological variables during the graded exercise test. Calculation of metabolic data resulting from the test. Prereq: KIN 620; KIN Exercise Science majors. Special fee. Writing intensive. 3 cr.

704. Clinical Stress Testing and Electrocardiography
Introduction to stress testing and electrocardiographic interpretation. Prereq: KIN 620, 621. KIN Exercise Science majors. 4 cr.

705. Topics in Applied Physiology
Advanced exercise physiology course dealing with topics both current and relevant to exercise science majors. Includes genetics, environmental influences, immune system, detraining and overtraining, epidemiology, ergogenic aids, and the influence of age and gender. Prereq: KIN 620, 621. KIN Exercise Science majors. 4 cr.

724. Metabolic Adaptations to Exercise
Overview of the metabolic processes that occur during exercise and metabolic changes that occur as a result of exercise training. Topics covered include glycogenolysis and glycolysis in muscle, cellular oxidation of pyruvate, lipid metabolism, metabolism of proteins and amino acids, neural and endocrine control of metabolism, and fatique during muscular exercise. Prereq: KIN 620; CHEM 404; KIN Exercise Science majors. Special fee. 4 cr.

736. Exercise Testing and Prescription
This course is designed to provide students exposure to the knowledge and practical experience necessary for establishing exercise programs in apparently healthy populations. Topics include fitness testing, test interpretation, and exercise prescription. Prereq: KIN 704. KIN Exercise Science majors. 4 cr.

Outdoor Education

540. Top Rope Rock Climbing
Introduction to the skills and safety systems associated with beginning rock climbing (e.g., top rope rock climbing, rappelling, bouldering) and the management of rock climbing in adventure programs. Prereq: KIN O.E. majors. Special fee. Lab. 2 cr.

541. Management of Initiatives and Challenge Courses
Management of adventure initiatives and challenge courses as an educational and therapeutic medium with a variety of populations. Focus on skill development, processing techniques, rescue skills, evaluation techniques, and applications to specific client groups. Prereq: KIN O.E. majors. Special fee. Lab. 4 cr.

543. Winter Backpacking Skills
Introduction to winter backpacking and wilderness living skills, including equipment, nutrition, minimum impact camping, snow physics, safety and medical issues, back country skiing techniques, snowshoeing, snow shelters, leadership issues, and environmental ethics. Emphasis technical applications and the implementation of these skills in adventure programs. Prereq: KIN O.E. majors. Special fee. Lab. 2 cr.

545. Wilderness Survival and Rescue
Advanced course focusing on wilderness search and rescue techniques, including wilderness first aid skills, preventing and preparing for survival situations, and coordinating search techniques. Wilderness Emergency Medical Technician (WEMT) status and skills highly desired. Prereq: KIN 547; 686; KIN O.E. majors. Special fee. Lab. 2 cr.

546. White Water Canoeing
A basic introduction to white water canoeing skills. Students gain a basic understanding of the equipment, techniques, and procedures to conduct canoeing activities in flat water, moving water, and white water environments. Emphasis on development of individual paddling skills, safe and conscientious paddling, and group management while on moving water. Prereq: KIN 552; KIN O.E. majors. Special fee. 3 cr.

547. Lead Rock Climbing
Advanced course focusing on lead rock climbing skills, including equipment, climbing techniques, multiple pitch route techniques, safety systems, and high-angle rescue skills. Prereq: KIN O.E. majors; KIN 540. Special fee. Multiple labs. 3 cr.

548. High Altitude Mountaineering
Knowledge, skills, and attitudes of mountaineering at high altitudes. Focus on techniques used when leading adventure experiences with groups for extended periods of time and distances. Covers back country skiing, advanced climbing techniques, avalanche issues, safety systems, and rescue skills. May be repeated. Prereq: KIN O.E. majors. Special fee. Multiple labs. 4 cr.

550. Outdoor Education Philosophy and Methods
The rationale and basic structure of effective teaching techniques and procedures for outdoor educa-

tion; uses an interdisciplinary approach. Special fee. Writing intensive. 4 cr.

551. Adventure Programming: Backcountry Based Experiences
Introduction to the planning and implementation of land-based backpacking programs. Students will demonstrate an understanding of backpacking equipment, trip planning and organization, instruction of basic camping skills, implementation of safety procedures and group management on backpacking trips. Prereq: KIN O.E. majors. Special fee. Lab. 3 cr.

552. Adventure Programming: Water Based Experiences
Introduction to the planning and implementation of canoe expeditions. Students will demonstrate an understanding of necessary canoeing equipment, trip planning and organization, instruction of basic canoeing strokes, implementation of safety procedures, canoe expeditioning skills and group management on canoe expeditions. Prereq: KIN 551; KIN O.E. majors. Special fee. Lab. 3 cr.

681. Theory of Adventure Education
Basic skills and theories necessary in developing adventure education activities. Prereq: KIN O.E. majors; KIN 682. Special fee. Writing intensive. 4 cr.

682. Outdoor Leadership
Provides students with leadership theory and experience in adventure programming. Prereq: KIN 541, 550, 551, 684, 685. Special fee. 4 cr.

686. Wilderness Emergency Medical Care
Standards of practice for professionals providing emergency medical care in remote areas. Consideration of prolonged transport times, severe environments, and the use of portable and improvised equipment. Topics include wilderness trauma and illness, search and rescue operations, and environmental emergencies. Prereq: current EMT-Basic and CPR certifications; KIN O.E. majors. Special fee. 4 cr.

#782. Therapeutic Applications of Adventure Programming
Examines the use of adventure activities as elements of therapeutic treatment plans. Incorporates theoretical seminars and associated practical experiences. Prereq: KIN 550 or 681; KIN O.E. majors. 4 cr.

#784. Programs in Outdoor Education
Provides students with an understanding of outdoor education program models currently being used, analyzing the principles underlying curriculum development and strategies for implementing such models. Prereq: KIN O.E. majors. 4 cr.

786. Organization and Administration of Outdoor Education
Study of the administration of outdoor education programs using a variety of organizational models. Students develop and, through simulated exercises, manage a program. Field experience. Special fee. KIN O.E. majors. Writing intensive. 4 cr.

Physical Education Pedagogy

500. Historical and Contemporary Issues in Physical Education
Topics include relationship to medicine, social reform, and education; growth of the profession and its linkage to cognate fields of knowledge; current legal, ethical, and political issues in exercise, sport, and physical training. Prereq: KIN P.E. Pedagogy or department approval. 4 cr.

501. First Aid—Responding to Emergencies
Covers the nationally accredited American National Red Cross First Aid—Responding to Emergencies and BLS-CPR professional rescuer course. May not repeat for credit. 2 cr. Cr/F.

504. Skill Analysis and Assessment
In skill analysis, preservice teachers in physical education will develop an ability to observe accurately, analyze the correctness of movement, diagnose errors in performance, and provide learners with appropriate feedback and remediation to correct errors in sport and movement. In addition, assessment in physical education will be explored. This course has two purposes: 1) for preservice teachers to learn to analyze and diagnose sport and movement of performane at various developmental levels, and 2) to develop a working knowledge of assessment in physical education. KIN P.E. Pedagogy majors only. 4 cr.

505. Activity Assisting
Student assists in the conduct of an activity course under the direct supervision of the course instructor and receives same number of credits as that of the activity course. May repeat once for credit with a different activity course. Prereq: sophomore standing. 0.5–2.0 cr. (maximum: 4 cr.) Cr/F.

563. Secondary Physical Education Pedagogy
Planning, implementing, and evaluating curricular models of instruction, as well as effective teaching strategies and styles relevant to secondary (grades 6–12) physical education is studied. Content and process knowledge is applied through microteaching episodes with peers. Systematic observation is introduced for the purpose of reflecting on teaching behaviors. Prereq: EDUC 500. Lab. 4 cr.

600. Movement Fundamentals
Includes content relevant to teaching elementary physical education. Students learn how to perform fundamental movement skills, design lessons based on skill themes, and the relationship of both to the content areas of educational dance and gymnastics. Prereq: department approval. 4 cr.

601. Lifetime Sports
Provides teachers with the technical knowledge as well as the psychomotor and pedagogical skills necessary for instructing lifetime activities, including tennis and badminton. Prereq: KIN P.E. Pedagogy majors. Special fee. 3 cr.

602. Adventure Activities
Provides teachers with the technical, physical, and teaching skills necessary to instruct adventure activities, initiatives, ropes course management, and orienteering. Prereq: KIN P.E. Pedagogy majors. Special fee. 3 cr.

603. Team Sports
Provides teachers with the technical, physical, and pedagogical skills necessary for instructing team sports, including soccer and volleyball. Prereq: KIN P.E. Pedagogy majors. 3 cr.

604A. Rhythmic Forms I
Emphasizes folk, square, and social forms of dance. Content focuses on the development of individual performance skills as well as the ability to design, implement, and evaluate learning episodes relative to the specific dance form. Prereq: department approval. Coreq: KIN 604B. 1.5 cr.

604B. Rhythmic Forms II
Introduces student to modern dance and creative movement. Content focuses on the development of individual performance skills as well as the ability to design, implement, and evaluate learning episodes relative to the specific dance form. Prereq: department approval. Coreq: KIN 604A. 1.5 cr.

605. Activity Teaching
Student teaches an activity course under supervision of activity program coordinator and receives twice the number of credits as that of the activity course. Check with activity program coordinator for available activity courses each semester. May repeat once for a maximum of 8 cr. Prereq: sophomore standing; permission; current certification in activity (if appropriate). 1–4 cr. Cr/F.

606. Secondary Physical Education Practicum
Students apply secondary content and process knowledge within microteaching experiences with peers. Students also teach grades 6 through 12 within the public school setting. Emphasizes lesson, unit plan design, and systematic observation. Prereq: KIN 563; KIN PE pedagogy majors. 4 cr.

608. Track and Field
Students acquire the foundational skills and learn about teaching strategies specific to the sport. Prereq: department approval. 1.5 cr.

609. Gymnastics
Students acquire the foundational skills and learn about teaching strategies specific to the sport. Prereq: department approval. 1.5 cr.

675. Motor Development
Characteristics of motor behavior across time, and the role of movement in children's and adolescents' total development. Growth processes, stage theory, as well as the relationship of maturation, experience, and the environment to motor development. Prereq: KIN 600; KIN P.E. pedagogy; family studies majors. 4 cr.

692. Elementary Physical Education Pedagogy
Planning, implementing, and evaluating a movement-based curricular model of instruction relative to teaching preschool and elementary-aged children physical education. Systematic observation, teaching, strategies and styles, lesson design, and methods of integrating academic subject matter into elementary physical education. Prereq: KIN P.E. pedagogy majors; KIN 600, 675. 4 cr.

#725. Motor Control Issues in Dysfunction
In-depth analysis of current motor control/learning theories from the fields of neurophysiology, psychology, and motor development as they relate to normal and pathological movement. Cognitive, anatomical, biomechanical, and physiological variables constraining movement organization discussed. Application of basic research findings for appropriate therapeutic approaches to motor dysfunction. Prereq: kinesiology and neurology or motor learning or equivalent. Lab. 4 cr.

#742. Diagnostic Motor Assessment
Overview of diagnostic and prescriptive procedures used in special physical education. Psychomotor

assessment instruments used by practitioners in the field are described that can be applied when discerning level of performance in children with special needs. Prereq: measurement procedures in physical education. Lab. 3 cr.

#744. Medical and Exercise Issues of Disabling Conditions
Study of disabilities caused by anomalies found in the neurological, cardiorespiratory, sensory, and musculoskeletal systems. Addresses exercise and programming techniques necessary for physical and motor development relative to present physiological functioning. Prereq: kinesiology or exercise physiology or equivalent. 3 cr.

781. Special Physical Education Pedagogy
Overview of special physical education. Addresses modifying instruction, expectations, and learning environment to accommodate physical and motor behaviors of students with disabilities. Prereq: KIN P.E. Pedagogy majors. Lab. 4 cr.

783. Elementary Physical Education Practicum
Provides opportunities for developing and refining elementary and special physical education movement content with pedagogical processes. Emphasis on demonstrating competence in teaching and establishing a least-restrictive learning environment. Prereq: KIN 692; PE pedagogy majors. 4 cr.

#785. Applied Behavior Management
Overview of applied behavior management procedures used in special physical education. A number of investigations and approaches used by researchers and practitioners in the field are described, practiced, and critically analyzed. Practice and theory of behavior management, to be applied with children who continually misbehave, exhibit behavior disorders, or have an emotional disturbance. Prereq: permission. Lab. 4 cr.

Sport Studies

561. History of American Sport and Physical Culture
Major individuals, organizations, and trends that influenced the development of an American industry in sports, active recreation, and physical fitness. Readings, discussions, and research projects provide experience in the craft and utility of history. Writing intensive. 4 cr.

562. Introduction to Sports Information
Basic concepts of sports information related to preparation of material for public relations including radio, television, and publications. Includes guest lecturers and work in the UNH Sports Information Office. 4 cr.

580. The Sport Industry
An overview of the various segments that make up the sport industry, including governing bodies, the mass media, sporting goods firms, players' and coaches' associations, public regulatory agencies, and secondary and higher education. Readings and discussions consider the development and structure of each segment, interactions between segments, legal issues, and policy implications. While the course will focus on the United States, there will be some comparison to other countries. 4 cr.

635. Sport in Literature
Survey of sport as it is recorded in literature and film, both classical and contemporary. Consideration of major theories for interpreting literature. Writing projects by students. Prereq: Sport Studies majors. 4 cr.

740. Athletic Administration
Introduces basic management components and processes used in the successful administration of school and college athletic programs. Topics include: planning, organizing, and managing sports programs, personnel, and policies; game scheduling; finances and facilities; equipment and event management; student support services; and key legal issues. Prereq: permission. 4 cr.

741. Sport in Society
Investigation of interrelationships among sport, culture, and society in an attempt to understand better the role and function of sport in contemporary society. Overview of selected sociocultural factors that influence and result from participation in sports. Prereq: SOC 400 or permission. 4 cr.

743. Sport Marketing
Survey of concepts and processes used in the successful marketing of sport programs and events. Special emphasis on the unique or unusual aspects of sport products, markets, and consumers. Prereq: MKTG 550 or permission. 4 cr.

750. Theories of Motivation in Sport and Exercise
Social cognitive theories of achievement motivation as they relate to sport and exercise participation. Special attention will be directed at social interactions in sport. Prereq: PSYC 401; permission. 4 cr.

761. Senior Seminar in Sport Studies
Discussions of sport studies topics, such as gambling, aggression, media, gender, race, class. Students will consider different disciplinary approaches to these topics and develop projects to advance knowledge related to their interests. Prereq: KIN 561; 741; 780;/or permission. Writing intensive. 4 cr.

#770. Psychological Skills in Performance
Provides essential elements of psychological skills training in performance. Focuses on mental aspects that enhance or inhibit physical performance. Theory, direct skill acquisition, and skill application are all integral to this course. Topics include: progressive relaxation, meditation, hypnosis, goal setting, and stress inoculation testing. Special fee. Prereq: PSYC 401 or KIN 780. 4 cr.

#775. Sports Writing
Introduction to basic concepts and skills of sports writing, emphasizing regular beat coverage of sports. Students learn how to write columns, advance, game, and feature stories; to develop and retain sources; and to conduct interviews. Sports journalism history and research into the representation of gender, race, and class in the print sports media examined. 4 cr.

780. Psychological Factors in Sport
Factors of outstanding athletic achievement; psychological variables in competition; the actions and interactions of sport, spectator, and athlete. Special attention directed to strategies for coaches, teachers, and athletic trainers to utilize sport psychology in their professional practice. Prereq: PSYC 401 or KIN 671. 4 cr.

790. Social and Health Issues in Sport Psychology
Current trends in social and health psychology as they pertain to the competitive sports environment. Includes adherence motivation, bulimia and anorexia in athletes, self-theory, exercise and depression, and substance abuse in sports. Prereq: PSYC 401 or KIN 671. 4 cr.

Languages, Literatures, and Cultures (LLC)

(For department note, see page 31. See also course listings under Classics, French & Italian, German, Greek, Japanese, Latin, Spanish & Portuguese, and Russian.)

Professors: Barbara T. Cooper (French & Italian), William F. Forbes (Spanish & Portuguese), Nancy Lukens (German), John C. Rouman (Classics), Jack A. Yaeger (French & Italian)
Associate Professors: Arna B. Bronstein (Russian), Roger S. Brown (German), John M. Chaston (Spanish & Portuguese), Richard V. Derosiers (Classics), Aleksandra I. Fleszar (Russian), Janet Gold (Spanish & Portuguese), Bernadette Komonchak (Spanish & Portuguese), Ronald D. LeBlanc (Russian), Edward T. Larkin (German), Claire-L. Malarte-Feldman (French & Italian), Grover M. Marshall (French & Italian), Mary E. Rhiel (German), Juliette M. Rogers (French & Italian)
Assistant Professors: Nadine S. Bérenguier (French & Italian), Stephen A. Brunet (Classics), Richard E. Clairmont (Classics), Lori Hopkins (Spanish & Portuguese), Lina Lee (Spanish & Portuguese), Alicia Q. Woodruff (Spanish & Portuguese), Dionisio L. Viscarri (Spanish & Portuguese)
Lecturers: Claudia Albini-Stephens (French & Italian), Mary K. Belford (Spanish & Portuguese), Claire-H. Gaudissart (French & Italian), Michelle S. Marnicio (Spanish & Portuguese), Anna S. Sandström (French & Italian), Henry M. Smith (French & Italian), Katharine E. Stansfield (French & Italian), Elisa F. Stoykovich (Spanish & Portuguese), Linda J. Thomsen-Breig (Spanish & Portuguese)

Latin (LATN)

Department of Languages, Literatures, and Cultures
(For program description, see page 41; for faculty listing, see page 178; see also course listings under Classics and Greek.)

New students will initially be assigned to the proper course on the basis of their scores on the College Board Achievement Test or number of years of previous study. Transfer credit will not be given for elementary-level courses in foreign languages if a student has had two or more years of the foreign language in secondary school.

401-402. Elementary Latin
Elements of grammar, reading of simple prose. (No credit for students who have had two or more years of Latin in secondary school; however, any such students whose studies of Latin have been interrupted for a significant period of time should consult the section supervisor about possibly receiving credit.) Special fee. 4 cr.

501. Review of Latin
Intensive review of Latin grammar and vocabulary. Designed primarily for those whose study of Latin has been interrupted for a year or more and for those who have had only two years of high school Latin. Special fee. 4 cr.

502. Latin Syntax and Composition
A continuation of LATN 501. Intensive review of Latin syntax; introduction to reading and composition. 4 cr.

503-504. Intermediate Latin
Review. Readings from Cicero, Caesar, Sallust, Livy, Catullus, Horace, Ovid, Plautus, Terence, and Seneca. Prereq: LATN 402 or equivalent. Special fee. 4 cr.

595, 596. Directed Reading in Latin
Independent study of a classical or medieval Latin author.May be repeated. Prereq: LATN 503, 504, or equivalent. 2–4 cr.

631-632. Latin Prose Composition
Grammar review; study of Latin prose style; English to Latin translation. Prereq: permission. Special fee. 4 cr.

751, 752. Cicero and the Roman Republic
Prereq: permission. 4 cr.

753, #754. Advanced Studies in the Literature of the Golden Age
A) Lucretius; B) Catullus; C) Caesar; D) Sallust; E) Vergil; F) Horace; G) Tibullus; H) Propertius; I) Ovid; J) Livy. Major Roman authors from the dictatorship of Sulla to the death of Augustus. Prereq: permission. 4 cr.

#755, 756. Advanced Studies in the Literature of the Silver Age
A) Seneca the Younger; B) Persius; C) Petronius; D) Lucan; E) Statius; F) Quintilian; G) Martial; H) Juvenal; I) Tacitus; J) Pliny the Younger. Major Roman authors from the reign of Nero to the death of Trajan. Prereq: permission. 4 cr.

791. Methods of Foreign Language Teaching
Objectives, methods, and techniques in teaching foreign languages from elementary grades through college. Discussion, demonstration, preparation of instructional materials, microteaching of the language skills. Prereq: permission. Special fee. 4 cr.

#795, 796. Special Studies in Latin
A) Minor Authors of the Republic; B) Plautus; C) Terence; D) Minor Authors of the Empire; E) Suetonius; F) Latin Church Fathers; G) Medieval Latin; H) Advanced Latin Composition; I) Introduction to Classical Scholarship; J) Latin Epigraphy; K) Italic Dialects; L) Comparative Grammar of Greek and Latin; M) Roman Law. Topics selected by instructor and student in conference. Prereq: permission. 4 cr.

Life Sciences and Agriculture (LSA)

(For program description, see page 79.)

400. Freshman Seminar
Assistance to the undeclared student in identifying a major within the College of Life Sciences and Agriculture, including the biological, natural, and social sciences. The goal of this seminar is to support students in developing a sound academic program and assist them in making a successful transition from high school to college. The seminar also covers strategies for being a successful college student. Guest speakers from departments and programs lead discussions on career opportunities. Required for all first-semester LSA undeclared students. 1 cr. Cr/F.

Linguistics (LING)

(For program description, see page 41.)

See also the list of courses approved for the major or minor at the linguistics entry in the front of this catalog.

505. Introduction to Linguistics
Overview of the study of language: universal properties of human language, Chomsky's innateness hypothesis, language acquisition in children, dialects and language variation, language change. Includes an introduction to modern grammar (phonology, syntax, and semantics) and to scientific linguistic methodology. (Also offered as ENGL 505.) 4 cr.

506. Introduction to Comparative and Historical Linguistics
Major language families (primarily Indo-European) and the relationships among languages within a family. Diachronic studies; methods of writing; linguistic change; glottochronology; etymological studies. Some language training and LING 505 desirable. (Also offered as CLAS 506.) 4 cr.

605. Introduction to Linguistic Analysis
Analysis and problem solving in phonology, morphology, and syntax using data from many languages. Emphasis is both practical (learning how to describe the grammar and sound system of a language) and theoretical (understanding languages' behavior). Prereq: LING/ENGL 505, or permission. (Also offered as ENGL 605.) 4 cr.

620. Applied Experience in Linguistics
Students who have an opportunity for appropriate career-oriented work experience may arrange with a faculty sponsor to add an academic component. The work must be related to the linguistics major, and nonacademic employers must normally be an established organization approved by Career Services. Research and writing required in addition to the job experience. Registration requires permission of employer, faculty sponsor, and major adviser. May be repeated with permission, to a maximum of 8 credits. Up to 4 credits may count toward the linguistics major requirements, with permission of the program coordinator. Prereq: LING 505; permission. 1–4 cr. Cr/F.

695. Senior Honors
Open to senior LING majors who, in the opinion of the department, have demonstrated the capacity to do superior work. Prereq: permission. 4 cr.

719. Sociolinguistics Survey
How language varies according to the characteristics of its speakers: age, sex, ethnicity, attitude, time, and class. Quantitative analysis methods; relationships to theoretical linguistics. Focus is on English, but some other languages are examined. Prereq: LING 505 or permission. 4 cr.

779. Linguistic Field Methods
Study of a non–Indo-European language by eliciting examples from an informant, rather than written descriptions of the language. Students learn how to work out the grammar of a language from raw data. Prereq: ENGL/LING 505. (Also offered as ENGL 779.) 4 cr. (Not offered every year.)

790. Special Topics in Linguistic Theory
Advanced course on a topic chosen by the instructor. Inquire at the English department office for a full course description each time the course is offered. Topics such as word formation, dialectology, linguistic theory and language acquisition, history of linguistics, language and culture, cross-disciplinary studies relating to linguistics. Barring duplication of subject, may be repeated for credit. (Also offered as ENGL 790.) Writing intensive. 4 cr.

793. Phonetics and Phonology
Sound system of English and of other languages viewed from the standpoint of modern linguistic theory, including the following topics: the acoustic and articulatory properties of speech sounds, the phonemic repertoires of particular languages, phonological derivations, and prosodic phenomena such as stress and intonation. Prereq: a basic linguistics course or permission. (Also offered as ENGL 793.) 4 cr.

794. Syntax and Semantic Theory
Relationship of grammar and meaning viewed from the standpoint of modern linguistic theory. Emphasis on the syntax and semantics of English, with special attention to the construction of arguments for or against particular analyses. Prereq: a basic linguistics course or permission. Writing intensive.(Also offered as ENGL 794.) 4 cr.

795, 796. Independent Study
A) Synchronic Linguistics; B) Diachronic Linguistics; C) Linguistic Theory. For students showing a special aptitude for linguistics who desire to pursue a line of inquiry for which no appropriate course is offered. All requests must be forwarded by the faculty sponsor to the director of the Interdepartmental Linguistics Committee. 1–4 cr.

Management (MGT)

(For program description, see page 98.)

Chairperson: Ross J. Giell
Professors: Stephen L. Fink, Francine S. Hall, Allen M. Kaufman, Michael J. Merenda
Associate Professors: Ross J. Gittell, William Naumes, Rita Weathersby
Assistant Professor: Carole K. Barnett
Lecturers: Ann L. Cunliffe, Joseph E. Michael, Jr., Gregory Theyel, Margaret Naumes

580. Introduction to Organizational Behavior
Application of behavioral science concepts to work settings in profit and nonprofit organizations. Individual behavior, interpersonal relations, work groups, relations among groups studied in the context of organizational goals and structure. Experiential focus. For nonbusiness administration majors and minors. No credit for students who have had MGT 611. Prereq: ACFI 501; ECON 401 or 402. 4 cr.

#602. Values in a Managerial Society
The role and influence of values on management decision making. The conflict between traditional values such as material progress, private property, self-interest, etc., and emerging notions about environmentalism, consumerism, worker and product safety, etc., is examined through case discussions and readings. 4 cr.

611. Behavior in Organizations
Behavioral science concepts applied to work settings. Focus on understanding and analyzing individual beliefs, values, goals, perceptions, motivation, commitment, and decision making; group structures and processes (interpersonal skills, communication, conflict resolution, leadership, and team work); organizational control systems (rewards, task design, performance appraisal); outcomes (satisfaction and development of the person as well as the organization); and organizational change. Open to WSBE majors only. No credit for students who have had MGT 580. Prereq: all Group A courses and junior standing. 4 cr.

614. Organization Theory
Provides a framework and concepts for understanding the nature and functioning of organizations of various types: business, educational, health, social service. Enhances students' skills as organizational members and managers. Includes organization structure and design, the organization's external environment, innovation, change, technology, decision making, culture, and leadership for organizational learning. Case discussions, class exercises, fieldwork. Prereq: juniors and seniors only; prior study of organizational behavior or an equivalent is desirable. 4 cr.

647-648. Business Law I, II
Law of contracts, agency, sales, negotiable instruments, real and personal property, partnership and corporations, with application of the Uniform Commercial Code. Prereq: at least junior standing; permission. 4 cr.

701. Business, Government, and Society
Managerial problem solving and decision making relative to economic, ethical, legal, political, social, and technological aspects of an organization's environment. Case discussion, stakeholder analysis, industrial ecology, and social issues management are important course components. Open to WSBE majors only. Prereq: all Group A and B courses. 4 cr.

703. Strategic Management: Decision Making
Capstone course: integrates the functional discipline skills within the role of the general manager, the external environment of the firm, and the strategic decision process. Uses case analysis, industry and competitive analysis, environmental scanning, and strategic audits. Open to WSBE majors only. Prereq: all Group A and B courses. 4 cr.

#712. Managing Change and Conflict in Organizations
Examines the primary sources, processes, and outcomes of change over the course of the entire organizational life cycle. Covers dynamics of change in both small and large groups and sub-groups, including transitions that are predictable and planned, unforeseen and crisis-laden, resisted and embraced, catastrophic and generative in nature. Prereq: permission; prior study of organizational behavior or an equivalent is desirable. 4 cr.

713. Management Skills
Focuses on the role of the manager, particularly the interpersonal competencies required to work effectively with superiors and subordinates. Participants develop and critique their behavior in situations that involve interviewing, listening, delegation, conflict management, performance appraisal, and handling problem employees. Includes written and verbal presentations, field study, and videotaping. Prereq: permission. 4 cr.

732. Exploration in Entrepreneurial Management
Examines the management of change and innovation, especially the role of entrepreneur in managing new ventures. Characteristic behavioral, organizational, financial, and marketing problems of entrepreneurs and new enterprises. Prereq: permission. 4 cr.

#745. International Business
Issues and problems confronting managers in the international economy. Emphasis on problems of working across national borders rather than on those encountered within the framework of different national economies, cultures, and institutions. For individuals interested in working in a multinational enterprise. Prereq: permission. 4 cr.

#755. International Management
Develops an understanding of international ventures and partnerships from the viewpoint of management, leadership, human resource management, and organizational structure and strategy. Emphasis on the impact of culture on business practices and on interpersonal skills and global perspectives needed for personal effectiveness in international and multicultural environments. Prereq: junior and senior standing. 4 cr.

765. Total Quality Management
Integration of management aspects of quality improvement with methodologies and tools for problem-solving and implementation. Experiential team projects and hands-on in-class exercises are used to supplement and enhance extensive written and video cases, facility tours, and guest speakers. (Also offered as DS 765.) Prereq: DS 650 and MGT 611 or permission. 4 cr.

770. Strategic Human Resource Management
Role of the human resource professional in leading personnel and human resource administration in organizations. Functions and scope of human resource management past, present, and future; current issues in human resource management; the human resource executive as organizational change agent; the human resource function's initiatives and responses to the changing nature of work. No credit for students who have had HMGT 635. Prereq: permission. 4 cr.

785. Career Management
Develops individual career management skills, including corporate career development. Topics include concepts of career development; issues pertaining to career management in organizations. Helpful for students interested in human resource management. Prereq: juniors and seniors only; permission. 4 cr.

798. Topics in Management
Special topics; may be repeated. Prereq: permission. 4 cr.

Marketing (MKTG)

(For program description, see page 99.)

Chairperson: Jonathan Gutman
Professors: Frederick G. Crane, Charles W. Gross, Jonathan Gutman
Associate Professor: Lucy L. Henke
Assistant Professor: Ludwig A. Bstieler
Lecturer: Jacalyn L. Cilley

550. Survey of Marketing
Focuses on marketing as the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods, and services to create exchanges that satisfy individual and organizational objectives. For nonbusiness administration majors and minors. No credit for students who have had MKTG 651. Prereq: ACFI 501; ECON 401 or 402. 4 cr.

651. Marketing
Covers marketing as the process of planning and developing goods and services to satisfy the needs of target customers: consumers, other businesses, and institutions. Focus on how marketing contributes to the firm's goals through product planning, pricing, promotion, and distribution policies. Open to WSBE majors only. No credit for students who have had MKTG 550 or HMGT 600. Prereq: all Group A courses and junior standing. 4 cr.

750. Strategic Marketing
Practical application of marketing principles taught in MKTG 651. Through case analysis, students will learn to apply marketing principles to the planning, organization and control of marketing activities in large national and multinational corporations and small businesses. Issues such as new product development, pricing policies, selection of domestic and international channels of distribution, and interrelationships between marketing, production, and finance will be covered. Prereq: MKTG 651 and permission. MKTG 752 and/or MKTG 753 are recommended. 4 cr.

751. Advertising and Promotion
Course covers the development of advertising strategy based on an assessment of the firm's competencies, its competitive environment, and an understanding of target customer behavior. Topic coverage includes the creation and execution of advertisements and sales promotions, media planning, and budgeting. The course draws upon the marketing principles taught in MKTG 651. Prereq: MKTG 651 and permission. MKTG 752 and/or MKTG 753 are recommended. 4 cr.

752. Marketing Research
Formulating research objectives to solve marketing problems: qualitative and quantitative techniques for surveys and marketing experimentation; commonly encountered analyses and models of secondary and primary data to aid marketers in decision making; strengths and limitations of marketing research in the marketing process. Prereq: MKTG 651 or equivalent. 4 cr.

753. Consumer/Buyer Behavior
Covers concepts, models, and theories from the behavioral sciences applied to consumer decision making and purchasing behavior. Examines consumer behavior from economic, psychological, sociological, and anthropological perspectives. Topic coverage includes discussion of marketing strate-

gies and tactics to influence consumer choice. Prereq: MKTG 651. 4 cr.

754. Retail Management
Analysis of managerial problems in retailing establishments. Focus is on operational problems, retail store organization, location analysis, buying and inventory management, retail financial management, and selling and sales promotion. Other areas include environmental effects on retailing, the formulation of retail strategy, human resource issues, and customer service. Prereq: MKTG 651. 4 cr.

#755. Marketing of Services
The marketing of intangible offerings. Includes profit and nonprofit situations, retail and business-to-business settings, public and international services. Covers theory, service quality attainments, design and strategy, and implementation plans. Texts, case analysis, speakers, field work. Prereq: MKTG 651. 4 cr.

756. Franchising
Designed to help acquire an understanding of franchising as a system of distribution and business expansion. Franchising will be studied from both the perspectives of the franchisee and the franchisor. In addition, economic, financial, and legal issues associated with franchising will be covered. By the end of the course, acquisition of skills and sources of information that would permit sound assessment of the business opportunities available in franchising. Prereq: MKGT 651. (Also offered as HMGT 756.) 4 cr.

760. International Marketing
Environmental factors affecting international trade: culture and business customs, political and legal factors and constraints, economic and technological development, and the international monetary system. Integration of these with the marketing management functions of market research and segmentation; product, promotion, distribution, and pricing decisions. Prereq: MKTG 651. 4 cr.

761. Sales Management
Principles and methods of successful personal selling and management of the sales function. Exposure to selling experience in field of student interest; case studies, sales presentations; oral and written analyses of sales management issues. Prereq: MKTG 651. 4 cr.

762. Marketing Workshop
Integrative study of a real marketing situation in a business, nonprofit institution, or government agency. Student teams identify the problem, collect appropriate data, suggest alternative solutions, and submit a recommended course of action. Prereq: MKTG 651 and permission. MKTG 752 and/or MKTG 753 are recommended. 4 cr.

798. Topics in Marketing
Special topics; may be repeated. Prereq: a basic marketing course and permission. 1–4 cr.

Mathematics (MATH)

(For program description, see page 62.)

Chairperson: Kenneth I. Appel
Professors: Kenneth I. Appel, Albert B. Bennett, Jr., Joan Ferrini-Mundy, Marie A. Gaudard, Donald W. Hadwin, A. Robb Jacoby, Joan R. Leitzel, Loren D. Meeker, Eric A. Nordgren, Samuel D. Shore, Donovan H. Van Osdol
Associate Professors: David V. Feldman, Liming Ge, William E. Geeslin, Karen J. Graham, Rita A. Hibschweiler, Edward K. Hinson, Ernst Linder, Berrien Moore III, Kevin M. Short, Debajyoti Sinha, Lee L. Zia
Assistant Professors: Kelly J. Black, William Jason Owen, Matthias Pfau
Instructor: Philip J. Ramsey
Faculty-in-Residence, Instructor: John B. Geddes, Gertrud L. Kraut
Skills Application Teacher: Martha B. Burton

#300. College Algebra
Review of functions and topics in algebra. Functional domains and ranges, composition of functions, inverse functions. Algebraic fractions, exponential expressions, roots, and radicals, logarithmic, and exponential functions. 0 cr.

***301. Elementary Math I**
Beginning algebra including integer operations, solving linear equations, graphing linear functions, solving linear inequalities, systems of linear equations, polynomials, rational expressions and equations, and exponents and radicals. May not be taken for credit toward a bachelor's degree. 4 cr.

***302. Elementary Math II**
Review of elementary algebra, exponents, polynomials, factoring, rational exponents, and absolute value. Solving linear and quadratic equations and inequalities; systems of equations; radical equations. Linear functions and related notions; quadratic functions. May not be taken for credit toward a bachelor's degree. Prereq: MATH 301 or the equivalent. 4 cr.

***305. Elementary Functions**
Properties of elementary functions, including exponential and logarithmic, trigonometric and inverse trigonometric functions. May not be taken for credit toward a bachelor's degree. Prereq: MATH 302 or the equivalent. 4 cr.

419. Evolution of Mathematics
Mathematics from antiquity to the present; origins of the various methods and branches. How and why such concepts as number and geometry evolved. Prereq: MATH 302 or the equivalent. Not offered for credit to mathematics majors. 4 cr.

420. Finite Mathematics
Topics selected from probability, systems of linear equations, matrix algebra, linear programming, mathematics of finance. Not a preparation for calculus. Prereq: MATH 302 or the equivalent. Not offered for credit to mathematics majors. 4 cr.

Note for calculus students: Students enrolling in MATH 424 are given a test on algebra during the first week of the semester. Those doing unsatisfactory work will be required to take MATH 305 before enrolling in MATH 424 or to complete review assignments in the Mathematics Center (MaC) concurrently with MATH 424.

424A. Calculus for Social Sciences
Real-valued functions and their graphs; derivatives and their applications; antiderivatives and areas; exponentials and logarithms; introduction to multivariable calculus and partial derivatives. CEPS majors not allowed. Primarily intended for majors in College of Liberal Arts and the Whittemore School.

Note: students who desire a two-semester calculus course are strongly advised to take MATH 425. Those students who successfully complete MATH 424A and subsequently wish to continue their study of mathematics with MATH 426 are required to successfully complete a supplementary module and examination on trigonometric calculus administered by the MaC Center. Prereq: MATH 305 or the equivalent. (Not offered for credit if credit is received for MATH 425.) 4 cr. (Fall semester only.)

424B. Calculus for Life Sciences
Real-valued functions and their graphs; derivatives and their applications; antiderivatives and areas; exponentials and logarithms; introduction to multivariable calculus and partial derivatives. CEPS majors not allowed. Primarily intended for majors in College of Life Sciences and Agriculture.

Note: students who desire a two-semester calculus course are strongly advised to take MATH 425. Those students who successfully complete MATH 424B and subsequently wish to continue their study of mathematics with MATH 426 are required to successfully complete a supplementary module and examination on trigonometric calculus administered by the MaC Center. Prereq: MATH 305 or the equivalent. (Not offered for credit if credit is received for MATH 425.) 4 cr. (Spring semester only.)

Note for calculus students: Students enrolling in MATH 425 are given a test on algebra and trigonometry during the first week of the semester. Those doing unsatisfactory work will be required to take MATH 305 before enrolling in MATH 425 or to complete review assignments in the Mathematics Center (MaC) concurrently with MATH 425.

425. Calculus I
Calculus of one variable covering limits; derivatives of algebraic, trigonometric, exponential, and logarithmic functions; applications include curve sketching, max-min problems, related rates, and volume and area problems. Prereq: MATH 305 or the equivalent. (Not offered for credit if credit is received for MATH 424.) 4 cr.

426. Calculus II
Second course in calculus of one argument, techniques and applications of integration, polar coordinates, and series. Prereq: MATH 425. 4 cr.

525. Linearity I
Examination of the fundamental role that linear models play in science and engineering; and the role of linearization in understanding nonlinear phenomena. Models are considered along several conceptual axes: discrete to continuous, one-dimensional to multi-dimensional, and static to dynamic, with an emphasis on the former. Mathematical areas of coverage include matrix algebra, concepts from calculus of several variables, difference equations, and linear transformations. Prereq: MATH 426, permission. Lab. 6 cr.

526. Linearity II
Continuation of study of linear models and the process of linearization begun in MATH 525, with an emphasis on models of dynamic phenomena. Additional mathematical areas of coverage include differential equations, eigenvalue and eigenvector analysis, phase plane analysis, and additional concepts from vector calculus. Prereq: MATH 525, permission. Lab. 6 cr.

* MATH 301, 302, and 305 may not be taken for credit

527. Differential Equations with Linear Algebra
Fundamental methods of solving first-order equations, essentials of matrix algebra; higher-order linear equations, and linear systems; series solutions; Laplace transforms; selected applications. Prereq: MATH 426. 4 cr.

528. Multidimensional Calculus
Partial differentiation; composite functions and chain rules; maximum and minimum; transformations; vector algebra; vector functions; gradient, divergence, and curl; curves and surfaces; multiple, line, and surface integrals; divergence, Green's, and Stoke's theorem. Prereq: MATH 426. 4 cr.

531. Mathematical Proof
Introduction to reading and writing proofs in mathematics. The basic language of mathematics common to all branches of the subject, especially set theory and basic logic. Prereq: MATH 426. Writing intensive. 4 cr.

532. Discrete Mathematics
Counting principles, (including permutations, combinations, pigeonhole principle, inclusion-exclusion principle); big-O relation; graphs, trees, and related topics. Prereq: MATH 531. 4 cr.

545. Introduction to Linear Algebra and Mathematical Proof
Introduction to mathematical writing and proof in the context of basic linear algebra. Designed to reinforce ideas seen throughout the mathematics curriculum. Centered on an intense study of vector spaces and linear systems, beginning with a brief study of linear system of equations, progressing to a discussion of linear transformation and vector spaces. No credit if credit has been received for MATH 645. Prereq: MATH 426. Writing intensive. 4 cr.

619. Historical Foundations of Mathematics
Historical development of number theory, geometry, probability, algebra, and analysis. Study of the significant mathematical contributions to these topics made by prominent mathematicians spanning several historical periods. Prereq: MATH 531 or 545. 4 cr.

621. Number Systems for Teachers
Problem solving; counting and set concepts, number systems (whole numbers, integers, rational, and real numbers); number theory; estimation and mental calculation techniques; and applications requiring calculators and computers. Manipulatives and models are used in a lab setting to illustrate the concepts and properties of the number systems and teach number sense. No credit offered toward mathematics major except for B.S. mathematics education-elementary and middle school options. Prereq: permission. 4 cr.

622. Geometry for Teachers
Properties of plane and space figures; tessellations; symmetry; LOGO computer language; nonstandard, English, and metric units of measure; area and perimeter; volume and surface area; estimations and approximations of measurements; constructions; congruence and similarity mappings; problem solving using geometric and algebraic skills, and applications requiring calculators and computers. Manipulatives and models are used in a lab setting to illustrate concepts and properties of geometry. No credit offered toward mathematics major except for B.S. mathematics education-elementary and middle school options. Prereq: MATH 621 or permission. 4 cr.

623. Topics in Mathematics for Teachers
Logic (valid and invalid forms of reasoning); descriptive statistics (graphs, measures of central tendency, measures of variation); inferential statistics (samplings, distributions, measures of relative standing, simulations); probability (experimental, geometrical, and theoretical); permutations and combinations; probability simulations; problem solving using skills from statistics and probability; mathematical connections and communication review of computer software; and applications requiring calculators and computers. No credit offered toward mathematics major except for B.S. mathematics education-elementary and middle school options. Prereq: 621 or permission. 4 cr. (Offered in alternate years during spring semester.)

639. Introduction to Statistical Analysis
A first course introducing concepts of probability and scientific methods for data collection and analysis. Exploratory data analysis, survey sampling, probability, discrete and continuous distributions, confidence intervals, hypothesis testing, comparing samples, linear regression, analysis of variance. Statistical software, such as JMP or Minitab used. Offered primarily for mathematics majors at the sophomore level; engineering majors are urged to take MATH 644. No credit for students who have completed ADM 430, BIOL 528, DS 420, EREC 525, HHS 540, MATH 644, PSYC 402, SOC 502. Prereq: MATH 426. 4 cr.

644. Statistics for Engineers and Scientists
Introduction to the design of controlled experiments and to the collection and analysis of scientific data. Use of a statistical software package is an integral part of the course; interpreting and drawing conclusions from standard software output is emphasized. Graphical data analysis, statistical process control, regression and correlation, multifactor experimental designs, confidence intervals, hypothesis testing. No credit for students who have completed MATH 639, ADM 430, BIOL 528, DC 420, EREC 525, HHS 540, PSYC 402, SOC 502. Prereq: MATH 426. 4 cr.

645. Linear Algebra for Applications
Fundamental notions of vector space theory, linear independence, basis, span, scalar product, orthogonal bases. The course includes a survey of matrix algebra, solution of systems of linear equations, rank, kernel, eigenvalues and eigenvectors, the LU- and QR-factorizations, and least squares approximation. Prereq: MATH 426. (Not offered for credit if credit is received for MATH 762.) 4 cr.

646. Analysis for Applications
Introduction to the solution of partial differential equations. Models arising from initial-boundary-value problems of mathematical physics and Sturm-Liouville problems are examined; solution techniques include separation of variables, Bessel functions, series expansions by orthogonal functions, and numerical methods. Prereq: CS 410, 412, or 416; MATH 527, 528;/or permission 4 cr.

647. Complex Analysis for Applications
Complex numbers, analytic functions, Cauchy-Riemann equations, conformal mapping, contour integration, Cauchy's integral formula, infinite series, residue calculus, Fourier and Laplace transforms. Prereq: MATH 528. (Not offered for credit if credit is received for MATH 788.) 4 cr.

656. Introduction to Number Theory
Unique factorization, arithmetic functions, linear and quadratic congruences, quadratic reciprocity law, quadratic forms, introduction to algebraic numbers. Prereq: MATH 531. 4 cr. (Offered in alternate years.)

657. Geometry
Advanced approach to fundamental properties of Euclidean and other geometries. Prereq: MATH 531. 4 cr.

658. Topics in Geometry
Topics selected from among projective geometry, finite geometrics, convexity, transformational geometry, non-Euclidean geometry, and other areas of elementary geometry within the framework of modern mathematics. Prereq: MATH 657. 4 cr. (Offered in alternate years.)

696. Independent Study
Projects of interest and value to student and department. Prereq: permission of faculty supervisor and department chairperson. 1–6 cr.

698. Senior Seminar
Exploration of mathematical topics beyond the student's previous coursework. Focus on problem solving, generation of problems, and oral and written communication of mathematics. Prereq: Senior standing in mathematics or mathematics education. 4 cr.

703. The Teaching of Mathematics, K–6
Methods of teaching; uses of manipulatives, models, and diagrams in instruction; purposes and methods of assessment; curriculum standards and goals; review and evaluation of textbooks and computer software; uses of calculators and computers; teaching reading and writing in mathematics. Prereq: MATH 621 or 721; EDUC 500 or permission. 4 cr. (Offered in alternate years during the fall semester.)

721. Number Systems for Teachers
Problem solving; counting and set concepts, number systems (whole numbers, integers, rational, and real numbers); number theory; estimation and mental calculation techniques; and applications requiring calculators and computers. Manipulatives and models are used in a lab setting to illustrate the concepts and properties of the number systems. Credit offered only to M.Ed., M.A.T., certification-only students, and in-service teachers. Prereq: permission. 4 cr.

722. Geometry for Teachers
Properties of two- and three-dimensional figures; tessellations; symmetry; nonstandard, English, and metric units of measure; area and perimeter; volume and surface area; estimations and approximations of measurements; constructions; congruence and similarity mappings; applications requiring calculators and computers. Manipulatives and models are used in a lab setting to illustrate concepts and properties of geometry. Credit offered only to M.Ed., M.A.T., certification-only students, and in-service teachers. Prereq: 721 or permission. 4 cr.

723. Topics in Mathematics for Teachers
Descriptive statistics; inferential statistics; simulations; probability (experimental, geometrical, and theoretical); permutations and combinations; problem solving using skills from statistics and probability; applications requiring calculators and computers. Credit offered only to M.Ed., M.A.T., certification-only students, and in-service teachers. Prereq: 721 or permission. 4 cr. (Offered in alternate years during spring semester.)

739. Applied Regression Analysis
Regression analysis explores relationships among variables by modeling a response. Simple linear regression, residual analysis and model validation, multiple linear regression, model selection, multicollinearity, nonlinear curve fitting, categorical predictors, introduction to analysis of variance and covariance. Students will be introduced to programming in SAS. Prereq: MATH 639 (or 644);/or permission. 4 cr.

740. Industrial Statistics and Design of Experiments
Emphasizes methods for solving complex problems, both in the industrial and research environments. Statistical process control, design of experiments, randomization and blocking, factorial designs, nested designs, fixed, random, and mixed effects models, fractional factorial designs, use of covariates, response surface methods. JMP software will be used extensively. Prereq: MATH 639 (or 644); permission. 4 cr.

741. Biostatistics and Life Testing
Exploration of models and data-analytic methods used in medical, biological, and reliability studies. Event-time data, censored data, reliability models and methods, Kaplan-Meier estimator, proportional hazards, Poisson models, loglinear models. SAS or JMP, and SPlus will be used. Prereq: MATH 639 (or 644);/or permission. 4 cr. (Offered in alternate years.)

742. Multivariate Statistical Methods
Issues dealing with multivariable response data. Random vectors and matrices, multivariate normal distribution, Hotelling's T^2, multivariate analysis of variance (MANOVA), principal components, cluster analysis, factor analysis, longitudinal data and repeated measures. SAS or SPlus will be used. Prereq: MATH 639 (or 644);/or permission. 4 cr. (Offered in alternate years.)

745-#746. Foundations of Applied Mathematics
Basic concepts and techniques of applied mathematics intended for graduate students and advanced undergraduates in mathematics, engineering, and the sciences. Topics include computational linear algebra, nonlinear differential equations, and partial differential equations. Methods examined include Fourier expansions and transforms, Laplace transforms, optimization techniques, linear spaces, eigenvalue analysis, Sturm-Liouville systems, numerical methods, conformal mapping, and residue theory. Prereq: MATH 527; 528, or equivalent. 4 cr.

747. Introduction to Nonlinear Dynamics and Chaos
The mathematics of chaos and nonlinear dynamics. Topics include: Linear and nonlinear systems of ordinary differential equations; discrete maps; chaos; phase plane analysis; bifurcations and computer simulations. Prereq: MATH 527; 528. 4 cr.

753. Introduction to Numerical Methods
Introduction to mathematical algorithms and methods of approximation. Topics include a wide survey of approximation methods. Methods examined include polynomial interpolation, root finding, numerical linear algebra, numerical integration, and the approximation of differential equations. Included in each case is a study of the accuracy and stability of a given technique, as well as its efficiency. Prereq: MATH 426; CS 410, 412, or 610. (Also offered as CS 753.) 4 cr.

754. Introduction to Scientific Computing
Introduction to the tools and methodology of scientific computing through the examination of interdisciplinary case studies from science and engineering. Emphasis on numerical approaches to solving linear systems, eigenvalue-eigenvector problems, and differential equations. Problems are solved on various hardware platforms using a combination of application software and data visualization packages. Prereq: CS 410, 412, or 416; MATH 527, 645, 753 or permission. (Also offered as CS 754, PHYS 754.) 4 cr.

755. Probability and Stochastic Processes with Applications
Introduction to the theory, methods, and application of randomness and random processes. Probability concepts, random variable, expectation, discrete and continuous distributions, joint distributions, stochastic processes, Markov chains, Poisson processes, moment-generating functions, convergence of random variables. Prereq: MATH 528 and 639; (or 644);/or permission. 4 cr.

756. Principles of Statistical Inference
Introduction to the basic principles and methods of statistical estimation and model fitting. One- and two-sample procedures, consistency and efficiency, likelihood methods, confidence regions, significance testing, Bayesian inference, nonparametric and resampling methods, decision theory. Prereq: MATH 755; or 528, 639 (or 644), and permission. 4 cr.

761. Abstract Algebra
Basic properties of groups, rings, fields, and their homomorphisms. Prereq: MATH 531 or 545. 4 cr.

762. Linear Algebra
Vector spaces over arbitrary fields, linear transformations and their relationship with matrices, eigenvalues and eigenvectors, the rational and Jordan canonical forms for linear transformations. Prereq: MATH 545 or equivalent; MATH 761. 4 cr.

#764. Advanced Algebra
Topics selected from rings, modules, algebraic fields, and group theory. Prereq: MATH 761. 4 cr. (Offered in alternate years.)

767. One-Dimensional Real Analysis
Theory of limits, continuity, differentiability, integrability. Prereq: MATH 531 or 545. 4 cr.

#776. Logic
Examination of the basic notions of soundness and completeness, first for sentential and then for propositional logic. Turning to the question of decision procedures for logical formulae, the concept of recursive function, which emerges in the work of Church and Turing, provides the essential link between logic and theory of computation. The course culminates with Gödel's Incompleteness Theorems, which demonstrate the intrinsic limitations of the logical method. Prereq: MATH 531. 4 cr. (Offered in alternate years.)

#783. Set Theory
Axiomatic set theory, including its history. Cantor's theory of infinite cardinal and ordinal numbers seemed laden with contradictions and paradoxes. A satisfactory treatment of these difficulties came with the axiomatic set theory of Zermelo and Fraenkel. This course develops the Zermelo-Fraenkel axioms and examines cardinal and ordinal arithmetic in the context they provide. The course then investigates the consequences of various additional axioms extending Zermelo-Fraenkel, such as the Axiom of Choice, the Continuum Hypothesis, large cardinal axioms and the axiom of determinancy. Prereq: MATH 531. 4 cr. (Offered in alternate years.)

784. Topology
Open sets, closure, base, and continuous functions; connectedness, compactness, separation axioms, and metrizability. Prereq: MATH 531. 4 cr.

788. Complex Analysis
Complex functions, sequences, limits, differentiation and Cauchy-Riemann equations, elementary functions, Cauchy's theorem and formula, Taylor's and Laurent's series, residues, conformal mapping. Prereq: MATH 767. (Not offered for credit if credit is received for MATH 647.) 4 cr.

791. The Teaching of Mathematics, 7–12
Methods for teaching middle and secondary school mathematics; survey of instructional materials; uses of models, calculators and computers; integrating reading, writing, and problem solving into mathematics curricula; methods of assessment; theories of learning mathematics; review and evaluation of curriculum materials, software, and instructional resources; and introduction to professional organizations and publications. Prereq: EDUC 500 or equivalent; MATH 426;/ or permission. 4 cr.

796. Topics in Mathematics
New or specialized courses not covered in regular course offerings. Prereq: permission. May be repeated up to 8 credits. 4 cr.

Mechanical Engineering (ME)

(For program description, see page 64.)

Chairperson: Barbaros Celikkol
Professors: Barbaros Celikkol, Todd Stuart Gross, Robert Jerard, M. Robinson Swift
Associate Professors: Kenneth C. Baldwin, Barry K. Fussell, James E. Krzanowski, John Philip McHugh, David W. Watt, John A. Wilson
Assistant Professor: Igor I. Tsukrov

441. Engineering Design and Graphics
Engineering design process and the language of graphical communication introduced via team design projects and laboratory exercises. Topics include sketching, 3-D visualization, computer-aided design, solid modeling, projection theory, engineering drawings, report writing, and oral communication. Special fee. Writing intensive. 4 cr.

503. Thermodynamics
Properties of a pure substance, work and heat, laws of thermodynamics, entropy, thermodynamic relations, cycles. Prereq: MATH 528. Special fee. Writing intensive. 3 cr.

523. Introduction to Statics and Dynamics
Overview of statics and dynamics; two- and three-dimensional force systems; laws of equilibrium; moments of area; volume; inertia; stresses and strains; particle and rigid body dynamics; fixed and moving reference frames; impulse-momentum principles; work-energy relationships. Prereq: MATH 426; PHYS 407. Not for ME majors. 3 cr.

525. Mechanics I
Introduction to statics. Two- and three-dimensional force systems, the concept of equilibrium, analysis of trusses and frames, centroids, bending moment and shear force diagrams, and friction. Prereq: MATH 426; PHYS 407. Special fee. Writing intensive. 3 cr.

526. Mechanics II
Introduction to strength of materials. Analysis of members under torsion, axial, shear and bending stresses, superposition of stresses, stability of columns. Prereq: ME 525. Special fee. Writing intensive. 3 cr.

542. Mechanical Dissection and Design Analysis
Engineering design and analysis of mechanical systems through in-depth dissection experiences. Relationships between functional specifications and design solutions, role of engineering analysis in design, and the importance of manufacturing constraints. Lab experiences include team dissections of mechanical artifacts, e.g., fishing reel, bike, electric drill. Introduction to basic metal working operations. Prereq: ME 441. Coreq: ME 525 and permission. Special fee. Lab. 4 cr.

561. Introduction to Materials Science
The concepts of materials science and the relation of structure to material properties. Atomic structure, bonding material transport, mechanical properties of materials, solidification, phase diagrams, solid state transformations, and corrosion and oxidation. Laboratory exercises are carried out to demonstrate the basic concepts of the course. Prereq: CHEM 405 or equivalent. Special fee. Writing intensive. 4 cr.

603. Heat Transfer
Analysis of phenomena; steady-state and transient conduction, radiation, and convection; engineering applications. Prereq: ME 608; CS 410 or 412. Special fee. 3 cr.

608. Fluid Dynamics
Dynamics and thermodynamics of compressible and incompressible fluid flow; behavior of fluids as expressed by hydrostatic, continuity, momentum, and energy equations. Prereq: ME 503. Coreq: ME 627. Special fee. Writing intensive. 3 cr.

627. Mechanics III
Introduction to particle and rigid body dynamics. Rectilinear and curvilinear motion, translation and rotation, momentum and impulse principles, and work-energy relationships. Prereq: ME 525 or permission. Special fee. Writing intensive. 3 cr.

629. Kinematics and Dynamics of Machines
Kinematic and dynamic analysis of mechanisms and their synthesis. Applications to reciprocating engines; balancing and cam dynamics are developed. Prereq: ME 627. Special fee. 3 cr.

643. Elements of Design
Analysis, synthesis, and design of machine elements and systems. Development of engineering judgment; selection of materials stress and failure analysis; kinematic arrangements; design for finite and infinite life. Open-ended design problems unify course topics. Prereq: ME 526; 561. Special fee. Writing intensive. 3 cr.

646. Experimental Measurement and Data Analysis
Basic and advanced techniques of engineering and scientific parameter measurement including statistical data and error analysis, curve fitting, calibration and application of transducers, and technical writing. Laboratory experiments draw on concepts from mechanics, thermodynamics, and fluid mechanics. Prereq: ME 526; 608. Special fee. Writing intensive. 4 cr.

670. Systems Modeling, Simulation, and Control
Lumped parameter models for mechanical, electrical, thermal, fluid, and mixed systems. Matric presentation, eigenvalues, eigenvectors, time domain solutions, frequency response plots, and computer simulations are used to explore system response. Design of system for desired responses. Introduction to feedback control, stability, and performance criteria. Prereq: EE 537; ME 608; MATH 527. Special fee. Writing intensive. 4 cr.

695. Special Topics in Mechanical Engineering
Course topics not offered in other courses. May be repeated for credit. Prereq: permission. Lab. 2–4 cr.

696. Mechanical Engineering Projects
Analytical, experimental, or design projects undertaken individually or in teams under faculty guidance. May be repeated for credit. 1–4 cr.

699. Engineering Internship
Intership experience provides on-the-job reinforcement of academic programs in mechanical engineering. Contact the Mechanical Engineering department office for guidelines. May be repeated to a maximum of 3 credits. Prereq: appropriate class standing in major, 2.5 grade point average, and permission. 1 cr. Cr/F.

#701. Macroscopic Thermodynamics
Thermodynamic principles using an analytic, postulational approach and Legendre transformations to obtain thermodynamic potentials. Prereq: ME 503 or permission. 4 cr.

#702. Statistical Thermodynamics
Macroscopic thermodynamic principles developed by means of microscopic analysis. Prereq: ME 503. 4 cr.

705. Thermal System Analysis and Design
Engineering design of thermal systems that involve real problems and analysis of performance of the design. Design criteria include function, performance, optimization, economy, safety, and others as appropriate for the system. Required for ME seniors. Prereq: ME 603. Special fee. Writing intensive. 4 cr.

707. Analytical Fluid Dynamics
Kinematics of flow; constitutive relationships; development of the Navier-Stokes equations; vorticity theorems; potential flow. Prereq: ME 608. 4 cr.

708. Gas Dynamics
Study of one-dimensional subsonic and supersonic flows of compressible ideal and real fluids. Wave phenomena; linear approach to two-dimensional problems; applications in propulsion systems. Prereq: ME 608 or permission. 4 cr.

709. Computational Fluid Dynamics
Review of matrix methods; basics of finite differences, basics of spectral methods, stability, accuracy, Navier-Stokes solvers. Prereq: ME 603 or permission. Special fee. 3 cr.

711. Coherent Optical Methods
Introduces electro-optic experimental techniques in mechanics. Optical fundamentals including elements of scalar diffraction theory, interferometry, holography, Doppler shifts, coherence, and laser speckle. Applications including mechanical strain measurements, vibrational mode determination, fluid pressure, temperature measurements, and fluid velocity measurements. Concepts from course are demonstrated in lab. Prereq: permission. 3 cr.

723. Advanced Dynamics
Classical dynamics oriented to contemporary engineering applications. Review of particle dynamics. Hamilton's principle and the Lagrange equations. Kinematics and dynamics of rigid bodies, gyroscopic effects in machinery and space structures. Prereq: ME 627 or permission. 4 cr.

724. Vibration Theory and Applications
Discrete vibrating systems. Linear system concepts; single-degree-of-freedom system with general excitation. Matrix theory and eigenvalue problems. Many degrees of freedom, normal mode theory for free and forced vibration. Numerical methods; introduction to continuous systems; applications to structural and mechanical systems. Prereq: ME 526; 627 or permission. 4 cr.

727. Advanced Mechanics of Solids
Stress, strain, stress-strain relations, anisotropic behavior, introduction to elasticity, plane stress/strain, bending and torsion of members with general cross-sections introduction to thin plates and shells, energy methods. Prereq: ME 526 or permission. 4 cr.

730. Mechanical Behavior of Materials
Elastic and inelastic behavior of materials in terms of micro- and macromechanics. Stress, strain, and constitutive relations related to recent developments in dislocation theory and other phenomena on the atomic scale and to the continuum mechanics on the macroscopic scale. Elasticity, plasticity, viscoelasticity, creep, fracture, and damping. Anisotropic and heterogeneous materials. Prereq: ME 526; 561 or permission. Special fee. 4 cr.

731. Fracture and Fatigue Engineering Material
Reviews fundamentals of linear elastic fracture mechanics and strain energy release rate analyses. Discusses basic methods of design for prevention of failure by fast fracture and fatigue for metals, ceramics, and polymers with attention to the effect of material properties and subsequent property modification on each design approach. Prereq: ME 526; 561 or permission. Special fee. 4 cr.

741. Nonlinear Systems Modeling
Modeling of hydraulic, pneumatic, and electromechanical systems. Solution methods including linearization and computer simulation of nonlinear equations. Development of methods of generalizing the nonlinear models for design purposes. Prereq: ME 670 or permission. Special fee. 4 cr.

744. Corrosion
The course is split into three parts. The first part reviews and develops basic concepts of electrochemistry, kinetics, and measurement methods. The second part covers the details of specific corrosion mechanisms and phenomena including passivity, galvanic corrosion, concentraction cell corrosion, pitting and crevice corrosion, and environmentally induced cracking. The third part

focuses on the effects of metallurgical structure on corrosion, corrosion in selected environments, corrosion prevention methods, and materials selection and design. Prereq: CHEM 405 or 403; 404; ME 561 or permission. Special fee. Lab. 4 cr.

747. Experimental Measurement and Modeling of Complex Systems
Experimental measurements for evaluation, design, and control of mechanical, electrical, and thermal/fluid phenomena. Emphasizes the dynamic response of both sensors and systems and the interactions between physical processes. Experimental examples are drawn from mechanics, material science, thermal-fluid science, and controls. Prereq: ME 561; 646; 670. Special fee. Writing intensive. 4 cr.

755. Senior Design Project I
Part I of a yearlong open-ended design experience required for all ME seniors. Undertaken individually or in teams under faculty guidance. Part I emphasizes project proposal development, design alternative evaluation, and a final design report. Typically taken in semester 7. TECH 797 or ME 777 may be substituted for this experience. Special fee. Writing intensive. 2 cr.

756. Senior Design Project II
Part II of a yearlong, open-ended design experience required for all mechanical engineering seniors. Undertaken individually or in teams under faculty guidance. Part II emphasizes the development and testing of the design proposed in Part I. Typically taken in semester 8. TECH 797 or ME 777 may be substituted for this course. Special fee. Writing intensive. 2 cr.

#757. Coastal Engineering and Processes
Introduction to small amplitude and finite amplitude wave theories. Wave forecasting by significant wave method and wave spectrum method. Coastal processes and shoreline protection. Wave forces and wave structure interaction. Introduction to mathematical and physical modeling. Prereq: ME 608 or permission. (Also offered as CIE 757 and OE 757.) 3 cr.

760. Physical Metallurgy I
Introduction to physical metallurgy: dislocations, thermodynamics of materials, diffusion, phase transformations, and strengthening mechanisms in solids. Prereq: ME 561 or permission. Special fee. Lab. 4 cr.

761. Diffraction and Imaging Methods in Materials Science
Introduction to x-ray diffraction and electron microscopy. Basic crystallography; reciprocal lattice; x-ray and electron diffraction; x-ray methods; transmission and scanning electron microscopy. Prereq: CHEM 405; PHYS 408 or permission. Special fee. Lab. 4 cr.

762. Electronic Properties of Materials
Introduction to the electronic properties of materials and their application in electronic devices. Crystallography, atomic bonding and energy band diagrams for semiconductors; intrinsic and extrinsic semiconductors; the p-n junction; diodes and transistors. Methods used in the manufacture of semiconductor devices, such as ion implantation, thermal oxidation, metallization, and packaging. Prereq: CHEM 405; MATH 527; PHYS 407; 408 or permission. 3 cr.

763. Thin Film Science and Technology
The processing, structure, and properties of thin solid films. Vacuum technology, deposition methods, film formation mechanisms, characterization of thin films, and thin-film reactions. Mechanical, electrical and optical properties of thin films. Prereq: ME 561 or permission. Special fee. 4 cr.

770. Design with Microprocessors
Basic operation of microprocessors and microcontrollers is explained, and interfacing these devices to sensors, displays and mechanical systems is explored. Topics include: number systems, architecture, registers, memory mapping, interrupts and interfacing for system design. Methods of programming and interfacing with mechanical/electrical systems are covered in class, and then implemented in lab. Prereq: EE 537 or permission. Special fee. Lab. 4 cr.

772. Control Systems
Development of advanced control system design concepts such as Nyquist analysis; lead-lag compensation; state feedback; parameter sensitivity; controlability; observability; introduction to nonlinear and modern control. Includes interactive computer-aided design and real-time digital control. Prereq: ME 747 or permission. (Also offered as EE 772.) Lab. 4 cr.

773. Electromechanical Analysis and Design
Analysis and design of electromechanical systems using lumped parameter models and magnetic finite element analysis (FEA). Electrostatic and magnetic field equations are discussed and used to derive magnetic and electric lumped model elements. Brushless dc motor is analyzed using lumped models and FEA. Various drive types are discussed and the motor system analyzed to obtain torque-speed curves. Design principles are given and utilized in a design project. Prereq: ME 670 or permission. Special fee. 4 cr.

777. Collaborative Engineering
Study of processes in which engineers from diverse disciplines cooperate to specify, design, manufacture, test, market, and maintain a product. Classes organized in both technical and nontechnical flexible modules. The technical topics are advanced and relevant to the project being developed, such as related research, technology, design methodology, and CAD tools. The nontechnical topics include ISO9000 quality system, engineering management, budget considerations, team building, communication and leadership skills, and concurrent engineering principles. The course utilizes collaborative engineering by team development of an engineering project, often a research-oriented, proof-of-concept prototype. The project is developed using ISO9000 principles and the Internet, and is accompanied by seminars and discussion sessions run by students who have been designated the project leaders. Prereq: senior standing. Special fee. Writing intensive. 4 cr.

#781. Mathematical Methods in Engineering Science I
Complex variables, Fourier series and transforms, ordinary and partial differential equations, vector space theory. Prereq: MATH 527; 528 or permission. 4 cr.

783. Geometric Modeling
Topics covered include curves, surfaces, solids, analytic and relational properties, intersections, transformations, and solid modeling. Emphasizes applications in computer graphics and CAD/CAM systems. Prereq: CS 410; MATH 528 or permission. Special fee. 4 cr.

786. Introduction to Finite Element Analysis
Topics include basic matrix theory, potential energy approach, direct stiffness method, calculus of variations, development of finite element theory, and modeling techniques. Applications in solid mechanics, heat transfer, fluids, and electromagnetic devices, via both commercially available codes and student-written codes. Prereq: ME 526, 603 or permission. Special fee. Lab. 4 cr.

795. Special Topics in Mechanical Engineering
New or specialized courses and/or independent study. May be repeated for credit. 2–4 cr.

797. Honors Seminar
Course enrichment and/or additional independent study in subject matter pertaining to a 600- or 700-level ME course other than ME 695, 696, 697, or 795. 1 cr.

Medical Laboratory Science (MLS)

(For program description, see page 72.)

Adjunct Professors: Glenn Littell, M.D., Walter Noll, M.D.
Associate Professor: Jae O. Kang
Assistant Professors: Christine L. Bean, Sylvia Countway, Joyce Stone
Adjunct Assistant Professors: Lacey Bangs, Deborah Brough, Anne Burbank, Kelly Hall-Quinn, Jill Polito

401. Introduction to Medical Laboratory Science
Functions and responsibilities of medical laboratory science as a unit of the health team. Lectures, films, demonstrations, and field trips. 1 cr. Cr/F.

500. Introduction to Medical Laboratory Methods and Techniques
Overview of medical laboratory procedures routinely used to diagnose common diseases such as anemia, mononucleosis, heart disease, leukemia, and diabetes. Emphasis on the clinical application of certain tests along with their theory and practice. Students learn proper techniques for use in a medical laboratory to assure accuracy and precision of patient results. Other topics include laboratory safety, instrumentation, and quality assurance. Prereq: CHEM 403-404 or CHEM 405. Special fee. Lab. 5 cr.

602. Medical Laboratory Seminars
Clinical case study presentations emphasizing the role of the laboratory in diagnosing and treating disease and in maintaining health. Prereq: senior MLS majors only or permission. Writing intensive. 2–4 cr.

610. Laboratory Management
Introduction to laboratory management, supervision, and education. Lectures, discussions, and student projects cover financial concerns, personnel management, and teaching skills. Prereq: senior MLS majors or permission. Writing intensive. 4 cr.

650A. Phlebotomy Theory
Procedures for blood collection by venipuncture and capillary puncture. Emphasis on professionalism, safety, equipment, laboratory orientation, and complications of the procedures. Students will observe all techniques and have a limited opportunity

to perform them. Prereq: sophomore MLS majors only or permission. 2 cr.

650B. Phlebotomy Clinical Internship
Students obtain experience and proficiency in blood collection techniques at a health care facility (100–120 hours). Prereq: MLS 650A; sophomore MLS majors or permission. 2 cr.

652. Clinical Hematology
Routine hematological procedures, both manual and automated. Analysis of white blood cells, red blood cells, and platelets; hemostasis techniques. Prereq: MLS major or permission. 3 cr.

652L. Clinical Hematology Lab
Prereq: MLS major or permission. Coreq: MLS 652. Lab. Special fee. 3 cr.

653. Clinical Immunohematology
Routine blood-banking procedures, including blood typing, antibody screening, cross-matching, and confirmatory testing on blood units. Prereq: MLS majors or permission. Special fee. 4 cr.

654. Clinical Chemistry
Laboratory safety, mathematics, introduction to instrumentation, and quality control. Clinical significance, evaluation, and performance of manual procedures. Includes analysis of plasma glucose, BUN, creatinine, electrolytes, enzymes, cholesterol, bilirubin, and uric acid determination. Prereq: CHEM 403-404; permission. 4 cr.

654L. Clinical Chemistry Laboratory
Prereq: CHEM 403-404; permission. Special fee. 1 cr.

655. Urinalysis and Body Fluids
Review of routine and special tests on urine and other body fluids. Emphasis on physical, chemical, and microscopic analytes and their relationship to health and disease. Prereq: MLS majors; permission. Special fee. 3 cr.

696. Independent Study
In-depth studies under faculty supervision. Prereq: junior standing; approval of the major adviser and the faculty of the area concerned. 2–4 cr. Cr/F.

700. Toxicology
Overview of effects of environmental pollutants, medications, and abused substances on human health. Emphasizes the mechanisms, assessment, and management of their toxicology. Prereq: one semester of organic chemistry, biochemistry, or permission. 4 cr.

720L. Clinical Mycology-Parasitology Lab
Prereq: MICR 602 or permission. Special fee. Lab. 2 cr.

751. Advanced Clinical Microbiology Internship
Advanced clinical bacteriological procedures, fluorescent techniques, and special procedures. Mycology and parasitology identification and testing. Prereq: senior MLS majors only. Special fee. 5 cr.

752. Advanced Hematology Internship
Special hematology procedures including diagnostic staining, advanced hemostasis studies, and evaluation of blood cells in disease states. Prereq: senior MLS majors only. Special fee. 5 cr.

753. Advanced Immunohematology Internship
Advanced blood-banking procedures, including antibody identification, and component therapy. Principles and procedures for detecting disorders of cellular and humoral immunity. Prereq: senior MLS majors only. Special fee. 5 cr.

754. Advanced Clinical Chemistry Internship
Theory, operation, evaluation, and maintenance of automated chemistry systems. Advanced laboratory analysis of body fluid chemistries including enzymology, isotopes, hormones, blood gases, and toxicology. Data analysis, computerization. Prereq: senior MLS majors only. Special fee. 5 cr.

761. Clinical Microbiology Internship
Advanced instruction in clinical bacteriology, mycology, parasitology, and virology at local hospital or reference laboratory. Isolation, identification, and antibiotic sensitivities for common pathogens are emphasized. Prereq: MICR 602; MLS majors only. 20 cr.

762. Clinical Hematology Internship
Advanced instruction in hematology and hemostasis at a local hospital or reference laboratory. Specialized tests such as automated cell counts, cytochemical analyses, cell markers, and specialized hemostasis are covered. Prereq: MLS 652; MLS majors only. 20 cr.

763. Clinical Immunohematology Internship
Advanced instruction in clinical immunohematology at a local hospital or reference laboratory. Pretransfusion testing, donor screening, phlebotomy, and component therapy emphasized. Prereq: MLS 653; MLS majors only. 20 cr.

764. Clinical Chemistry Internship
Advanced instruction in clinical chemistry at a local hospital or reference laboratory. Analysis of carbohydrates, proteins, enzymes, lipids, hormones, electrolytes, blood gases, and drugs. Prereq: MLS 654; MLS majors only. 20 cr.

Microbiology (MICR)

(For program description, see page 88.)

Chairperson: Robert M. Zsigray
Professors: Richard P. Blakemore, Thomas G. Pistole, Frank G. Rodgers, Robert M. Zsigray
Associate Professor: Aaron B. Margolin
Assistant Professors: Frank Caccavo, Jr., Louis S. Tisa
Research Assistant Professor: Stephen D. Torosian

500. Microbes and Sustainable Living
Provides an acquaintance with the microbial world with an emphasis on its importance to humans. Selected infectious diseases of current global significance discussed to illustrate the frustrating maleficence of certain microbes as well as the numerous ways in which microorganisms are beneficial in foods and nutrition, agriculture, industry, and pollution abatement. Laboratory emphasizes microbe hunting as a cure for microphobia. By means of field trips and lab exercises in which maintenance of sterility is frequently not important, students learn to find, observe, collect, and cultivate numerous kinds of harmless microorganisms. These include photosynthetic, salt-loving, luminescent, acid-tolerant, and magnetic bacteria, as well as plant symbionts and fermentative microbes. Microscopy optional; autoclaving unessential; but inquiry paramount. Special fee. Lab. 4 cr.

501. Microbes in Human Disease
Microorganisms have a profound effect on our everyday lives. This effect can often be dramatic enough to capture many of today's news headlines. Did you ever wonder why people died from eating hamburgers contaminated with *E. coli*? How do "flesh-eating bacteria" function? Will there be an AIDS vaccine? This course explores the answers to these and many other fascinating questions by examining the role of microorganisms in human disease. The fundamental structure, metabolism, genetics, and ecology of clinically relevant bacteria, viruses, fungi, and parasites are presented in relationship to the human host and its immune system. The foundation, incidence, and control of microbial diseases are presented through case studies. Emphasis on active learning in which students participate in classroom discussions, experiments, and demonstrations. Laboratory exercises designed to introduce techniques for the identification of important pathogenic microorganisms and disease diagnosis. Special fee. Lab. 4 cr.

503. General Microbiology
Principles of microbiology; morphology, physiology, genetics, culture, and classification of bacteria and other microorganisms; and their relationships to agriculture, environment, industry, sanitation, and infectious diseases. Prereq: BIOL 411-412 or equivalent; CHEM 403-404 or equivalent. Special fee. Lab. 5 cr.

600. Field Experience
A supervised experience providing the opportunity to apply academic experience in settings associated with future professional employment and/or related graduate opportunities. Must be approved by a faculty advisor selected by the student. Prereq: permission. May be repeated to a maximum of 8 credit hours. Only 4 credit hours can be used toward the major. 1–4 cr. Cr/F.

603. Bacteriology of Food
Lectures and laboratories will address modern technical concepts of the microbiology, physiology, and biochemistry related to food sanitation. Theoretical and practical approach serves as an integrative experience. Food sanitation is a serious public health issue in the meat, dairy, fish, and water industries. Benefits students seeking employment in public health or sanitary microbiology fields. Topics include: food as a substrate for microorganisms, causes of food spoilage, foodborne disease outbreaks, public health complications, isolation and identification of food spoiling microorganisms, and essentials for food safety and sanitation. Prereq: MICR 503 or equivalent. Special fee. Lab. 5 cr. (Not offered every year.)

700. Pathogenic Microbiology
Morphologic, cultural, biochemical, serologic, epidermiologic, and pathogenic characteristics of microorganisms causing human and animal diseases. Discussion of clinical presentation in host and laboratory diagnoses and treatment measures. Prereq: MICR 503. Special fee. Lab. 5 cr.

#702. Infectious Disease and Health
Principles underlying the nature of infectious

agents; the diseases they cause; pathogenic strategies; response of the host; intracellular parasitism; epidemiology; control measures including vaccines and chemotherapy; action of antimicrobial chemotherapeutic agents; pharmacokinetics and drug metabolism. Ethical issues in infectious disease covered. Well-established pathogens and newer, emerging human and animal disease agents covered. Prereq: MICR 700; permission. Special fee. Lab. 5 cr.

704. Genetics of Prokaryotic Microbes
Expression and transfer of genetic elements (chromosomal and nonchromosomal) in prokaryotic microorganisms; consideration of factors influencing public health, industry, the environment, and society. Students earning credit for PBIO 754; BCHM 754; GEN 754 may not receive credit for MICRO 704. Prereq: MICR 503; BCHM 658. Special fee. Lab. 4 cr.

705. Immunology
Introduction to the major cellular and molecular components of the immune system; examination of their development and production, their interactions with each other and with other systems in the body, and their regulation; exploration of their role in beneficial and harmful immune responses in humans and animals. Prereq: MICR 503. Special fee. Lab. 5 cr.

706. Virology
Principles of animal and selected plant and bacterial virology in relation to infection and disease. Emphasis on the molecular biology of viruses, viral replication, isolation, propagation, assay, pathogenesis, diagnosis, detection, epidemiology, and control. Prereq: MICR 503. 3 cr.

707. Marine Microbiology
Qualitative and quantitative evaluation of the physiological activities of microorganisms that influence the state of carbon, nitrogen, sulfur, iron, manganese, phosphorous, hydrogen, oxygen, and other elements in the sea and its sediments. Provides an understanding of the interrelationships between marine microorganisms and their surroundings by integrating microbiological phenomena with known aspects of physical, chemical, and biological oceanography. Introduces students to the primary scientific literature in marine microbiology, teaches each student how to think provocatively and concertedly, and convey those thoughts clearly and concisely in both oral and written form. Prereq: MICR 503. Special fee. Lab. 5 cr.

708. Virology Lab
Principles and practices of animal, selected plants, and bacterial virological methods for the propagation, detection and enumeration of viruses. Prereq: MICR 503. Coreq: MICR 706. Special fee. 2 cr.

710. Electron Microscopy and Microbial Cytology
Ultrastructure of eukaryotes, prokaryotes, and viruses. Role of bacterial appendages; cell membranes and cell walls; cytoplasmic inclusions; cell division and sporulation and virus ultrastructure. Preparative electron microscopy techniques for biological material described in detail. Practical applications of electron microscopy instrumentation together with theory of electron optics, and instrument function discussed. Prereq: MICR 503; permission. 3 cr. (Not offered every year.)

711. Genetics of Eukaryotic Microbes
Expression and transfer of cytoplasmic traits in eukaryotic microbes including fungi, algae, protozoa, and *Caenorhabditis elegans*. Laboratory experience in DNA sequence entry retrieval and analysis. Macintosh workstations are used for accessing and retrieving data from the National Library of Medicine and other sources via the Internet. Prereq: MICR 503; BIOL 604. (Also offered as BCHM 711 and GEN 711). Special fee. Lab. 4 cr.

712. Electron Microscopy Laboratory
Operation of electron microscopes; manipulation of instrumentation and specimens. Application of shadowing, negative staining, embedding, thinsectioning, labeling, freeze-fracture/etching of biological specimens; photographic techniques; interpretations of micrographs. Project work. Prereq: MICR 503; permission. Coreq: MICR 710. Special fee. 3 cr. (Not offered every year.)

713. Microbes and the Environment
Physiological ecology as required to understand the roles of microbes in matter and energy flow through ecosystems. Structure and function of aquatic, terrestrial, and biotic habitats in which microbes are important, including life in biofilms. Consideration is given to (micro)biotic community interactions, including syntrophy, consortial mixtures, and stable symbioses between prokaryotes and eukaryotes. Lab provides experience with methods of evaluating composition, structure, and activity of microbial communities including extraction of nucleic acids from the environment and ecological use of oligonucleotide probes. An important facet of both lab and lecture includes biochemistry of and enrichment, isolation, and enumeration methods for physiological groups of aerobic and anaerobic microbes (such as denitrifiers, sulfate reducers, metal reducers, homoacetogens, celluloytics, nitrogen fixers, diverse extremeophiles and autotrops including nitrifyers, methanogens, and photosymthetics). Prereq: MICR 503. Special fee. Lab. 5 cr.

714. Water Pollution Microbiology
Application of general principles of microbial ecology to water pollution. Study of viruses, bacteria, algae, and parasites found in contaminated water: their genetics, physiology, occurrence, detection, and health implications in addition to the organic and inorganic chemistry of the water they are found in. Prereq: MICR 503. Special fee. Lab. 4 cr. (Not offered every year.)

716. Advanced Immunology
Selected topics in immunology based on current trends and class interest. Recurring topics include AIDS, tumor immunology, vaccine development, and antimicrobial immunity. Off-campus visits to research and commercial facilities. Prereq: MICR 705; BCHM 658 or 751; permission. Special fee. Lab. 4 cr. (Not offered every year.)

717. Microbial Physiology
Fundamental physiological and metabolic processes of bacteria and fungi with a strong emphasis on prokaryotes. Literature-based course. Topics include regulation of and coordination of microbial metabolism, bacterial cell cycle, function of prokaryotic cell structure, diversity of energy metabolism, and microbial cell differentiation. Prereq: MICR 503, BCHM 658 or 751; permission. Special fee. Lab. Writing intensive. 5 cr.

718. Ethics and Issues in Microbiology
In conjunction with advances being made in the biological sciences is the need for scientific integrity. From guiding students in the laboratory to scientifc record keeping, from authorship and peer review to potential conflicts of interest, from use of animals and humans in research to genetic technology, scientists need to understand the ethical issues that underlie their work. These and related issues will be presented and discussed in a format that encourages both an appreciation of established guidelines and an opportunity to critically examine them. Writing intensive. 3 cr. (Not offered every year.)

719. Prokaryote Biodiversity
By what means can we evaluate the composition and diversity of the prokaryotic world? What are the molecular techniques which have provided new ways of collecting taxonomic and phylogenetic data and the evaluating the evolutionary history of prokaryotes? How can we use molecular methodologies epidemiologically to track the distribution of particular strains of microorganisms? What characteristics distinguish each fascinating group of (known) prokaryotes? In addition to exploring these topics, students in this course will isolate new strains of microbes and will proceed to identify and characterize them by molecular and other methods. The laboratory will also enable students to learn how to examine natural habitats for the presence of particular prokaryotic groups in the absence of cultivating their representatives. Prereq: MICR 503. Special fee. Lab. 5 cr.

#720. Marine Microbial Ecology
Examines the fundamental role of marine microbial communities in the function of the biosphere. Lectures survey bacterial, protozoan, and micrometazoan assemblages from Arctic to deep sea vent communities. Laboratory exercises cover several principle techniques of field microbial ecology and explore the rich marine microbial environment surrounding the Isles of Shoals. Lab. 4 cr. (Summers only, at Shoals Marine Lab.)

751. Cell Culture
Theory and principles fundamental to the culture of cells in vitro. Introduction to techniques of preparation and maintenance of animal, plant, insect, and fish cell cultures. Application of cell culture to contemporary research in biological sciences. Prereq: MICR 503; permission. (Also offered as ANSC 751 and PBIO 751. No credit if credit received for MICR 752 or ANSCI 746.) Special fee. Lab. 5 cr.

752. Mammalian Cell Culture
Basic concepts and techniques associated with the cultivation of mammalian cells *in vitro*, including media preparation, cell viability, transfer, cloning, cryopreservation; use of transformed cells harboring cloning vectors for production of bioproducts. (Also offered as ANSC 752. No credit if credit received for MICR 751 or ANSCI 746.) Prereq: MICR 503. Special fee. Lab. 5 cr.

795. Problems in Microbiology
Special projects in microbiology. Research topics in immunology; virology; microbial genetics; pathogenics; microbial ecology; microbial physiology; marine microbiology as well, as teaching experience. Prereq: permission. 1–8 cr.

Military Science (MILT)

Reserve Officers Training Corps
(For program description, see page 109.)

Professor of Military Science: Lt. Col. William F. Anderson
Assistant Professors: Capt. Kevin M. Nash, Capt. Gary A. Handley, Capt. Brenda K. Lloyd

413. The Defense Establishment and National Security
Elements of the U.S. defense establishment and their roles in national security. Functional interrelationships: service branches, tactical maneuver elements, major commands, operating agencies, other uniformed services, and civilian agencies. The principle of civilian control. Current world events of significance to the Army officer. Leadership laboratory required for cadets. 1 cr.

414. Military Skills I
Introduction to land navigation, expedient medical care, casualty processing, and cardiopulmonary resuscitation. Leadership lab required for cadets. 1 cr.

501. American Military History
Development of American military institutions, civil-military relations, and use of military forces as an instrument of national policy from the Revolutionary War to the present. Emphasis on battle campaign analysis. Lab (required only of cadets). 2 cr.

502. Military Skills II
Standard military map reading and use, principles of leadership, general first aid, and selected communications and technical skills development. Lab (required only of cadets). 2 cr.

601. Military Leadership & Management I
Introductory studies in human relations, interpersonal communications, and group interaction which relate to management and leadership application. Participative leadership and management, motivation and self-actualization. Emphasis on interrelationship between supervision, management, and leadership, and hands-on application of theory to practice. Lab. 2 cr.

602. Military Leadership & Management II
Further studies in human relations, interpersonal communication, and group interaction. Demonstrated abilities required in leadership and management. Emphasis on theory of training methods with the functions of military management and dynamic leadership. Prereq: MILT 601. Lab. 2 cr.

611. Seminar on Leadership & Management I
Examination of the military skills and professional knowledge needed for a second lieutenant. Emphasis on various Army management systems and the new lieutenant's responsibilities to the Army and to his/her superiors and subordinates. Lab. 2 cr.

612. Seminar on Leadership & Management II
Examination of fundamentals of military law to develop the students' understanding of military-specific offenses and disposition procedures. Law of war and professional ethics also discussed. Prereq: MILT 611. Lab. 2 cr.

695. Officer Internship
Experiential learning through fieldwork in a military-type unit. Written analysis required. Prereq: MILT 611 (may be taken concurrently). By permission only. May be taken up to a total of 8 credits. 1–4 cr.

Music (MUSI)

(For program description, see page 41; see also course listings under Music Education.)

Chairperson: Peggy A. Vagts
Professors: Nicholas N. Orovich, Keith Polk, John E. Rogers, David E. Seiler, Robert Stibler, Peggy A. Vagts
Adjunct Professor: Clark Terry
Associate Professors: Mark S. DeTurk, Robert W. Eshbach, Christopher Kies, W. Niel Sir, Peter W. Urquhart, Larry J. Veal, Kathleen Wilson
Assistant Professors: Michael J. Annicchiarico, Daniel Beller-McKenna, Andrew A. Boysen, David K. Ripley
Instructors: Thomas B. Keck, Arlene P. Kies
Lecturers: Sharon Baker, John Boden, Stephanie Curcio, Les Harris, Jr., Margaret Herlehy, John B. Hunter, Christopher Kane, Susan J. Larson, David Newsam, Janet E. Polk, John B. Skelton, Nancy Smith, Demetrius Spaneas

History, Literature, and Appreciation

401. Introduction to Music
Fundamental approach to perceptive listening, based on a detailed study of several masterpieces representing different periods and forms. Historical perspective, but main emphasis is on confronting significant works of musical art on their own terms. Some participation in musical life of the University required. Does not fulfill a major requirement. 4 cr.

402. Survey of Music History
The study of the development of musical styles and idioms in the context of selected historical and cultural aspects of Western civilization. 4 cr.

#501-502. History and Literature of Music
Styles, forms, and techniques of composition in Western music. Required of all music majors. 3 cr.

511. Survey of Music in America
From colonial times to the present, including the various European influences, the quest for an American style, and the emergence of such indigenous phenomena as jazz. 4 cr.

512. Survey of African American Music
Survey of African American music written for the concert stage. Includes both vocal and instrumental music forms, for small and large ensembles from approximately 1850 to present. The recorded compositions demonstrate a fusion of African, American, and European traditions. Composers studied include: Thomas Greene (Blind Tom), Frank Johnson, James Bland, Samuel Coleridge Taylor, William Grant Still, Florence Price, Julia Perry, Nathaniel Dett, William Dawson, Undine Smith-Moore, Margaret Bonds, John Work, Olly Wilson, and Scott Joplin. Jazz considered as it relates to and has its roots in a particular concert work. An occasional field trip to hear an African American performance required. Music majors may receive elective credit. 4 cr. Cr/F.

#513. Introduction to the Music of Africa and Asia
Folk and classical music of various ethnic cultures, particularly those of Japan, India, and sub-Saharan Africa. 4 cr.

#581. Harmony in Traditional Jazz and Popular Music
A practical course in the harmonization of popular songs and "blues." Typical chord progressions; their logic, extensions, and symbolic representations. Written exercises and instrumental improvisation. Prereq: knowledge of notation and fundamental harmony; ability to perform on a musical instrument. Some keyboard skill highly desirable. Permission. 4 cr.

595. Special Topics in Music Literature
Open to music majors and nonmajors; topics in areas not easily covered in historical courses. Prereq: permission. May be repeated for credit. 1–4 cr.

#609. Ethnicity in America: The Black Experience in the Twentieth Century
Team-taught course investigating music, literature, and social history of black America in the period of the Harlem Renaissance, in the Great Depression, World War II, and in the 1960s. Special attention to the theme of accommodation with, and rejection of, dominant white culture. Writing intensive. (Also offered as ENGL 609 and HUMA 609.) 4 cr.

#701. Music of the Medieval Period
Nature of the beginnings of polyphony. The preeminent influence of the church in the 13th century and the rising secular movement in the 14th. Music as a dominant force in the political and social life of the Middle Ages. 3 cr.

703. Music of the Renaissance
Works of the 15th- and 16th-century composers from Dunstable to Palestrina. Writing intensive. 3 cr.

#705. Music of the Baroque
Music of Europe from de Rore to Bach. Writing intensive. 3 cr.

707. Music of the Classical Period
Growth of musical styles and forms from early classicism through the high classicism of Haydn, Mozart, and the young Beethoven. Writing intensive. 3 cr.

709. Music of the Romantic Period
A survey of romanticism in music from Beethoven's late period to the end of the 19th century. The works of Schubert, Berlioz, Schumann, Mendelssohn, Chopin, Wagner, Verdi, Brahms, Austrian symphonists, French pre-impressionists, and national styles in European music. Writing intensive. 3 cr.

711. Music of the 20th Century
Styles and techniques of composers from Debussy to the present. Special emphasis on tonal music before World War I; neoclassical trends; the emergence of atonality and serial techniques; antirationalist music; electronic music. Writing intensive. 3 cr.

#713. The Art Song
History and literature of the solo song with piano accompaniment. Survey of national styles of the

19th and 20th centuries and deeper study of the central core of the art song—the German Lied. 3 cr.

#715. Survey of Opera
History of the genre from Monteverdi to the present. Representative masterpieces by Handel, Mozart, Beethoven, Weber, Wagner, Verdi, Mussorgsky, Debussy, Berg, and others. 3 cr.

#717. Survey of Pianoforte Literature
Keyboard literature from the Baroque to the present. Analysis, discussion, and illustration of works by Bach, Haydn, Mozart, Beethoven, the romantic composers, and contemporary writers. 3 cr.

795. Special Studies in Music
A) J. S. Bach; B) Franz Schubert; C) Debussy and Ravel; D) The World of Jazz; E) The Iconography of Western European Musical Instruments; F) 19th-Century French Music; G) Advanced Analysis; H) Advanced Study in Electronic Music; I) Composition through Computer-generated Sound; J) Woodwind Literature; K) Brass Literature; L) String Literature; M) Medieval Performance Practice; N) Renaissance Performance Practice; O) Baroque Performance Practice; P) Classical Performance Practice; Q) 19th-Century Performance Practice; R) 20th-Century Performance Practice; S) Woodwind Repair; T) String Repair; U) Advanced Jazz Improvisation; V) Advanced Piano Pedagogy; W) Advanced Accompanying; X) Advanced Conducting; Y) Independent Study. Prereq: permission. May be repeated for credit with permission. 1–4 cr.

Performance

Registration for ensemble courses (441-461) should be completed during the registration period. All ensemble courses may be repeated. A maximum of 8 credits earned in ensemble may be used toward graduation.

441. Concert Choir
A mixed chorus that studies and performs classical and modern literature. Recommended for voice majors. Open to all students. Prereq: permission. 1 cr.

442. Chamber Chorus
A mixed chorus which studies and performs sacred and secular works from the Renaissance to the present, participates with the opera workshop and with the orchestra, and serves as a nucleus for larger choral-instrumental work. Prereq: permission. 1 cr.

#443. Women's Chorus
Open to all students interested in singing the finest literature in this medium and who can fulfill the requirement of an audition. 1 cr.

448. Opera Workshop
Operatic singing, acting, and production techniques; performance of both complete operas and operatic excerpts. Prereq: permission. 1 cr.

450. Symphony
Presents several concerts during the year, of repertoire ranging from the great, standard symphonic literature to experimental, multimedia composition. Prereq: permission of conductor and audition. 1 cr.

#451. UNH Training Orchestra
Designed for music education majors, but open to all who wish to develop proficiency on major or secondary instruments. Ensemble experience in the basic repertoire often met in school situations for students who do not yet meet the standards required for the UNH Symphony. 1 cr.

452. Wind Symphony
Open to all students. Campus concerts and New England tour. Prereq: permission and audition. 1 cr.

453. Symphonic Band
Original band music, transcription, marches, etc. For students whose program does not permit music as a major interest, but who are interested in maintaining their playing proficiency and continuing their study of music. Prereq: permission. 1 cr.

454. UNH Marching Band
Open to all students; performs during home and away football games. Rehearsals conclude at the end of the football season. Prereq: permission. 1 cr. Cr/F.

455. Piano Ensemble
Drawing from available student instrumentalists and singers, pianists learn the art of performing in trios, duo sonatas, and two-piano works, and gain experience in Lieder accompaniment. 1 cr.

456. String Ensemble
457. Woodwind Ensemble
458. Brass Ensemble
459. Percussion Ensemble
460. Jazz Ensemble
In these five courses, MUSI 456 through MUSI 460, groups of instrumentalists gain experience in the performance of literature for the smaller ensemble. Prereq: permission. 1 cr.

461. Vocal Jazz Ensemble
Singers perform in small ensembles such as trios, quartets, quintets, and octets. Prereq: permission. 1 cr.

467. Functional Piano
Basic instruction for music majors with no previous keyboard training. Pianoforte technique, keyboard harmony geared to the practical harmonization of simple melodies, sight reading, transposition, and modulation. May involve both class instruction and periodic short individual lessons. Prereq: permission. Special fee. 1 cr.

468. Voice Class
Basic instruction in voice for nonmajors and music majors who are not majoring in voice. Prereq: permission. Special fee. May be repeated to a total of 2 credits. 1 cr.

In courses 536-564 and 736-764 (private instruction in performance) presentation and material used vary from pupil to pupil. The emphasis is on musical values and sound technique. As the student advances, repertory is broadened to include works of all periods. One solo performance each semester may be required.

Private lessons are given weekly and are one hour or one half-hour in length; an hour master class is given on alternate weeks. One semester-hour credit may be earned with the half-hour lesson; two, three, or four semester hours of credit may be earned with the one-hour lesson. In general, only students in performance in the bachelor of music curriculum are allowed to register for private lessons of more than two credits. Five one-hour practice periods are expected for each credit of private study. The special semester fee for lessons is $105 for 1 credit, $210 for 2 credits, $315 for 3 credits, and $420 for 4 credits (this fee applies for courses numbered 541-564 and for courses numbered 741-764). The fee includes the use of a practice room for the required preparation.

Registration in courses of private instruction is generally restricted to music majors. Nonmajors may enroll on a space available basis, subject to approval by the Department of Music and the instructor. Students may register for credit in successive semesters.

536/736. Early Wind Instruments
Private instruction in Renaissance and Baroque wind instruments. Special fee. 1–4 cr.

#537/737. Early String Instruments
Private instruction in Renaissance and Baroque string instruments. Special fee. 1–4 cr.

541/741. Piano
Private instruction in piano. Special fee. 1–4 cr.

542/742. Harpsichord
Private instruction in harpsichord. Special fee. 1–4 cr.

543/743. Organ
Private instruction in organ. Special fee. 1–4 cr.

544/744. Harp
Private instruction in harp. Special fee. 1–4 cr.

545/745. Voice
Private instruction in voice. Special fee. 1–4 cr.

546/746. Violin
Private instruction in violin. Special fee. 1–4 cr.

547/747. Viola
Private instruction in viola. Special fee. 1–4 cr.

548/748. Violoncello
Private instruction in violoncello. Special fee. 1–4 cr.

549/749. String Bass
Private instruction in string bass. Special fee. 1–4 cr.

550/750. Classical Guitar
Private instruction in classical guitar. Special fee. 1–4 cr.

551/751. Flute
Private instruction in flute. Special fee. 1–4 cr.

552/752. Clarinet
Private instruction in clarinet. Special fee. 1–4 cr.

553/753. Saxophone
Private instruction in saxophone. Special fee. 1–4 cr.

554/754. Oboe
Private instruction in oboe. Special fee. 1–4 cr.

555/755. Bassoon
Private instruction in bassoon. Special fee. 1–4 cr.

556/756. French Horn
Private instruction in French horn. Special fee. 1–4 cr.

557/757. Trumpet
Private instruction in trumpet. Special fee. 1–4 cr.

558/758. Trombone
Private instruction in trombone. Special fee. 1–4 cr.

559/759. Euphonium
Private instruction in euphonium. Special fee. 1–4 cr.

560/760. Tuba
Private instruction in tuba. Special fee. 1–4 cr.

561/761. Percussion
Private instruction in percussion. Special fee. 1–4 cr.

562/762. Keyboards
Private instruction in keyboard instruments. Special fee. 1–4 cr.

563/763. Jazz Guitar
Private instruction in jazz guitar. Special fee. 1–4 cr.

564/764. Drum Set
Private instruction in drum set. Special fee. 1–4 cr.

731-732. Conducting
Physical aspects, equipment of conductor, fundamental gestures and beats, baton techniques. Reading and analysis of full and condensed scores, study of transposition, psychology of rehearsal. Prereq: MUSI 571-572 and junior standing. 2 cr.

#735. Collegium Musicum
Instrumentalists and singers perform small ensemble music from all periods, with emphasis on Renaissance and Baroque music. Prereq: permission. 1 cr.

Theory and Composition

411–412. Fundamentals of Music Theory
Elements of music theory for the nonmusic major; principles of musical structure, analysis, elementary written counterpoint and harmony, and ear training. May not be counted for credit toward a music major. Prereq: ability to read music and permission of instructor. 4 cr.

471–472. Theory I
Introduction to the tonal system; species counterpoint; principles of voice leading and harmonic progression through the analysis, realization, and composition of one-, two-, and four-voiced textures. Concept of triad inversion and consonant diatonic harmonies of the major and minor modes. Students should register for MUSI 473-474 concurrently. Prereq: permission. 3 cr.

473–474. Ear Training I
Laboratory exercises to develop aural skills; sight-singing and dictation. Students should register for MUSI 471-472 concurrently. Prereq: permission. 1 cr.

571–572. Theory II
Continuation of MUSI 471-472. Compositional and analytic work stresses the treatment of dissonance within the tonal system; accessory tones, seventh chords, tonicization, modulation, basic principles of chromatic harmony, and harmonization of chorale melodies are covered. Students should register for MUSI 573-574 concurrently. Prereq: MUSI 472; 474; permission. 3 cr.

573–574. Ear Training II
Laboratory exercises to develop aural skills further. Students should register for MUSI 571-572 concurrently. Prereq: MUSI 472; 474; permission. 1 cr.

771–772. Counterpoint
Contrapuntal techniques of tonal music. Melodic construction and dissonance treatment through work in species counterpoint and studies in harmonic elaboration and prolongation. Analysis of selected compositions emphasizes the connection between fundamental contrapuntal techniques and the voice-leading of composition. Prereq: MUSI 572 or permission. 2 cr.

#773. Advanced Counterpoint
Continuation of MUSI 772. Prereq: MUSI 772 or permission. 2 cr.

775–776. Composition
Construction of phrases, periods, and short compositions following classical models. Problems of text-setting. Prereq: MUSI 572 or permission. 3 cr.

777. Advanced Composition
Continuation of MUSI 776. Individual compositional projects. Prereq: MUSI 776 and permission. May be repeated for credit. 3 cr.

779. Orchestration
Characteristics of band and orchestral instruments both individually and in small (homogeneous) and large (mixed) groupings. Students study scores, write arrangements, and have arrangements performed if at all possible. Some aspects of vocal writing. Prereq: MUSI 572 or permission. 3 cr.

781, 782. Analysis: Form and Structure
Introduction to analytical techniques through the study of representative masterworks: formal and structural elements and their interrelationships. Semester I: analysis of 18th- and 19th-century works; semester II: analysis of 20th-century works. Prereq: MUSI 572 or permission. 3 cr.

785. Electronic Sound Synthesis
Computers and digital synthesizers, methods of sound synthesis (e.g., fm synthesis, sampling), MIDI programming in VisualBasic and C++, control programs for synthesizers, notation using computers (e.g., Finale for PC and Macintosh). 4 cr. (Generally offered in the spring.)

Music Education (MUED)

(For program description, see page 43; for faculty listing, see page 188; see also course listings under Music.)

#500. Exploring Music Teaching
Introductory fieldwork course for students to explore music teaching as a career. Observation, teaching, research, examination of multimechanical aids for music curriculum development. In the MUED curriculum, this course is not required if EDUC 500 is taken with a music department professor. 2 cr. Cr/F.

540. Beginning Techniques in Voice
Basic techniques of voice production. Individual work is emphasized. Working knowledge of an instrument required. This course is desirable for, but not restricted to, MUED majors. Prereq: permission. 2 cr.

545, 546. Beginning Techniques in String Instruments
Class and individual instruction. Four hours practice per week. Training on the violin, viola, cello, and double bass. Classroom procedures, establishment of string programs, and evaluation of available methods materials. 2 cr.

595. Special Projects in Music Education
Individual investigation, research, or study. Creative projects may be included. A) Marching Band Methods and Techniques. Prereq: permission. 1–4 cr.

741–742. Techniques and Methods in Choral Music
Problems in the organization and performance of high school, college, and community choruses. Techniques of choral conducting and rehearsal, repertory, and materials. 2 cr.

743. Materials and Methods in Piano Music
Gives potential piano teachers a coherent but flexible approach to the instruction of students of different ages and levels of talent through evaluation of methods and materials and discussion of the role of the private teacher. 2 cr.

#745–746. Techniques and Methods in String Instruments
Class and individual instruction. Four hours of practice per week required. Intensive training on the violin, viola, cello, and double bass enables participants to perform in string ensembles. Classroom procedures, establishment of string programs, and evaluation of available methods materials. 2 cr.

747–748. Techniques and Methods in Woodwind Instruments
Basic fundamentals of performance, class instruction, associated acoustical problems and study of woodwind literature. First semester: clarinet, flute, and saxophone. Second semester: double-reed instruments. 2 cr.

749. Techniques and Methods in Brass Instruments
Basic course in embouchure formation, tone, tonguing, fingering, flexibility, accuracy, and range development as applied to the trumpet or baritone horn, French horn, and trombone; methods, studies, solos, and ensembles most likely to be useful with grade school, junior high school, and high school players of brass instruments. 2 cr.

751. Techniques and Methods in Percussion Instruments
Basic performance skills on snare drum, timpani, mallet instruments, and other percussion instruments used in bands and orchestras. Materials and methods of instruction. 2 cr.

#785. Music for the Elementary Classroom Teacher
Basic skills and techniques for the nonspecialist. Correlation and integration of music in the school curriculum. 4 cr.

790. Teaching Elementary School Music
Experiential approach toward learning creative strategies for teaching elementary school music. Includes various curricula and methods; philosophy and psychology of music; demonstration of materials and instruments. Observation and teaching in schools. Prereq: piano proficiency. 3 cr.

791. Teaching Secondary School Music
Assembling, managing, and teaching junior/senior high school music curriculum. Academic issues of philosophy, curriculum building, application of learning theories, administration, evaluation, motivation, and classroom management combined with field experience in lesson planning and teaching/rehearsal techniques. Prereq: piano proficiency; MUSI 731-732. 3 cr.

792. Seminar in Music Teaching
Group discussion and demonstration of effective music teaching. On-site examinations of school music teaching. Organization and teaching of curriculum units. Normally taken during student teaching semester. 3 cr.

795. Special Studies in Music Education
Allows upper-level students to explore individually or in groups areas related to their specific professional interests. Prereq: permission. 1–4 cr.

Natural Resources (NR)

(For program description, see page 78; see also course listings under Environmental Conservation, Forestry, Soil Science, Water Resources Management, and Wildlife Management.)

Chairperson: Theodore E. Howard
Professors: John D. Aber, John E. Carroll, Robert T. Eckert, John A. Litvaitis, William W. Mautz, William H. McDowell, Barrett N. Rock
Adjunct Professors: Christopher Eagar, C. Anthony Federer, Peter W. Garrett, James W. Hornbeck, William B. Leak, Mary E. Martin, Sidney A.L. Pilgrim, Lawrence Safford, Paul Edwin Sendak
Associate Professors: Russell G. Congalton, Christine V. Evans, Theodore E. Howard, Paul C. Johnson, Peter J. Pekins, Debra L. Straussfogel, Richard R. Weyrick
Research Associate Professors: Stephen H. Jones, Frederick T. Short
Adjunct Associate Professors: Richard J. DeSeve, David Y. Hollinger, Rakesh Minocha, Lawrence J. Prelli
Assistant Professors: Kimberly J. Babbitt, Mimi Larsen Becker, Mark J. Ducey, Daniel J. Zarin
Research Assistant Professor: David M. Burdick
Adjunct Assistant Professors: Jill L. Bubier, Bert Cohen, Jeffrey H. Gove, Richard Hallett, Bruce Kantner, Mariko Yamasaki

401. Natural Resources Perspectives
Introduction to conservation and management of living and nonliving natural resources. The economics, ethics, history, politics, and science of resource use and misuse; an overview of resource career preparation and opportunities. Selected lab/field/discussions/problem solving of forest, marine, soil, water, waste, and wildlife issues. Restricted to Department of Natural Resources freshmen. Lab. Special fee. 4 cr.

410. Insects and Society
Insects and their relations to humans, their environments, and their activities. Special fee. Lab. Writing intensive. 4 cr.

412. Introductory Entomology
Insect structure and function, development, classification, ecology, behavior, and evolution for students in the biological sciences; importance of insects in terrestrial and aquatic ecosystems. Insect collection required. Special fee. Lab. 4 cr.

500. Investigations in Natural Resources
Series of lectures/seminars featuring speakers from on and off campus on a variety of topics in natural resources sciences. Not offered for credit. May be repeated. Prereq: permission. Cr/F.

602. Natural Resources and Environmental Policy
Contemporary natural resource and environmental policy problems/issues addressed from a policy sciences perspective with emphasis on domestic policy solutions. Critical assessment of major policy initiatives and their implementation toward sustainable resource use and a healthy environment. Public policies analyzed to determine the extent to which their implementation strategies have succeeded, and to assess their adequacy within a bioregional or ecosystem approach and/or capacity to integrate economic and environmental decisions. Cases include national and local policies in their global context. Students apply public policy analysis and decision tools in laboratory sessions. Restricted to Department of Natural Resources juniors and seniors. Special fee. Writing intensive. 4 cr.

650. Principles of Conservation Biology
Overview of the major issues in conservation biology. Course lectures and discussions address three major themes: the importance of biological diversity, factors that determine levels of biological diversity, and the ways that expanding human populations can accommodate the requirements of wild plants and animals. Develops an appreciation for challenges encountered while maintaining or restoring local, regional, and global biological diversity. Prereq: one semester of biology, botany, or zoology. 4 cr.

675. CEOP Projects
The Community Environmental Outreach Program matches students with an interest in environmental issues with community groups with environmental problems to be addressed. Students form consulting teams of from two to four students to work with the community during the academic year. May be repeated for a maximum of 4 credits. Prereq: permission. 2–4 cr. Cr/F.

702. Natural Resource Workshops
Short-term courses (generally a few days to two weeks) offered off-campus by the A) New Hampshire Audubon Society and B) Appalachian Mountain Club, as well as C) Nature Study covering a broad variety of environmental and natural resource topics. E) Community Mapping. May be repeated. Special fee required depending on topic. 1–4 cr. Cr/F.

709. Fire Ecology Seminar
Lectures, guest lectures, and student presentations dealing with the natural role of fires in wild land communities, fire adaptations in plant and animal species. Human responses to wild land fires and prescribed fire applications. Optional set of one-half to one-day field trips for an additional 1 credit. Prereq: basic ecology course; junior, senior. Special fee. Variable 2–3 cr. (Not offered every year.)

#712. Sampling Techniques
Techniques of sampling finite populations in environmental sciences; choice of sampling unit and frame, estimation of sample size, confidence limits, and comparisons of sample designs. Prereq: BIOL 528 or equivalent. 2–4 cr. (Not offered every year.)

713. Quantitative Ecology
Applied quantitative techniques: basic concepts in probability and statistics applied to ecological systems; population dynamics; spatial patterns; species abundance and diversity; classification and ordination; production; and energy and nutrient flow. Additional credit for in-depth mathematical analysis of a particular topic. Prereq: intro. courses in calculus, statistics, and ecology. Writing intensive. 4 cr. (Not offered every year.)

714. Ecosystems of Puerto Rico
Field examination of a variety of tropical ecosystems in Puerto Rico including cloud forest, montane rain forest, tropical dry forest, mangroves and coral reefs. Field study supplemented by appropriate readings from the scientific literature and expert presentations. Students are responsible for round-trip airfare and personal expenses. Prereq: two of the following three: 1) FOR 527 or BIO 541; 2) SOIL 501 or ESCI 401; 3) WARM 603; permission. 1 cr. Cr/F.

730. Terrestrial Ecosystems
Processes controlling the energy, water, and nutrient dynamics of terrestrial ecosystems; concepts of study at the ecosystem level, controls on primary production, transpiration, decomposition, herbivory; links to earth system science, acid deposition, agriculture. Prereq: FOR 527; PBIO 412 or BIOL 411;/or permission. Special fee. Lab. 3 cr.

753. Decision Sciences in Natural Resource Management
Application of decision science methods (optimization, simulation, input-output, and statistics) to natural resources problems. Emphasis on practical work in evaluating projects, dealing with risk and uncertainty, analyzing regional impacts, valuing nonmarket resources, and exploring sustainability of managed forests. Prereq: FOR 643 or intermediate microeconomics. Special fee. Lab. Writing intensive. 4 cr.

757. Photo Interpretation and Photogrammetry
Practical and conceptual presentation of techniques for using remote sensing, specifically aerial photographs, in natural resources. Includes photo measures of scale, area, parallax and object heights; flight planning; photo geometry; an introduction to the electromagnetic spectrum; and photo interpretation and mapping. Concludes with an introduction to digital remote sensing including multispectral scanners, radar, and thermal imagery and a brief discussion of geographic information systems (GIS). Applications to forestry, wildlife, land-use planning, earth sciences, soils, hydrology, and engineering. Prereq: algebra. Special fee. Lab. 4 cr.

759. Digital Image Processing for Natural Resources
Introduction to digital remote sensing including multispectral scanners (Landsat and SPOT) radar and thermal imagery. Hands-on image processing including filtering, image display, ratios, classifica-

tion, registration, and accuracy assessment. GIS as it applies to image processing. Discussion of practical application. Use of ERDAS image processing software. Knowledge of PCs and DOS required. Prereq: NR 757 or equivalent and permission. Special fee. 4 cr.

760. Geographic Information Systems in Natural Resources
Introduction to the use of geographic information systems (GIS) for use with natural resources including data input, manipulation, storage, analysis, and display. Accuracy of spatial data and use of digital elevation models. Discussion of practical applications. Use of PC Arc/Info software. Prereq: permission. Special fee. Lab. 4 cr.

775. Natural Resources Senior Project
Multidisciplinary approach to land-use planning. Provides experience with dynamics of working in a group to identify, evaluate, and suggest management strategy to solve environmental problems. Class will be divided into small groups, each of which will choose or be assigned a real problem. Each group will act as a consulting firm in developing management strategies. Prereq: senior standing in the Department of Natural Resources and permission. Special fee. Writing intensive. 2 cr.

Nursing (NURS)

(For program description, see page 74.)

Professor: Judith A. Sullivan
Associate Professors: Gene E. Harkless, Margaret A. Lamb, Dorothy D. Rentschler, Raelene Shippee-Rice, Rosemary Y. Wang, Carol L. Williams-Barnard
Assistant Professors: Diana M. Crowell, Jeffrey A. Eaton, Elizabeth Ely, Judith A. Evans, Susan J. Fetzer, Barbara H. Kautz, Liza Little, Kathryn R. Lynch, Judith A. Metcalf, Denise M. Nies, Joan S. Reeves, Linda Robinson, Alison H. Sweatt

501. Introduction to Nursing
Examines the values and philosophy of the Department of Nursing. Explores the four domain concepts of nursing: health and how it is defined, the diverse clients served by nursing, nursing as a profession, and the complex environment within which nursing is practiced. The nature of nurse-client encounters is explored with an emphasis on teaching students the skills to interact in a caring, facilitative manner. 4 cr.

502. Concepts of Pathophysiology/Pharmacology
Focuses on concepts of pathophysiology/pharmacology relevant to nursing practice. The physiologic response and manifestations of alterations in normal body functioning are analyzed and the effects of pharmacological agents on these alterations are examined. Prereq: ZOOL 507-508; MICR 501; majors only. 4 cr.

508. Foundations of Nursing Judgment
Focuses on the knowledge and analytical skills required to adequately assess the health status of individuals. Students learn how to collect data using an assessment framework, analyze the data, and identify client resources and problems. Emphasizes the implications of the individual's developmental status, culture, and biologic variations at all points in the assessment process. Prereq: ZOOL 507-508; NUTR 475; MICRO 501; PSYC 401; NURS 501; majors only. Coreq: NURS 502, 514. Prereq or coreq: FS 525. 4 cr.

514. Techniques of Clinical Nursing
Focuses on the acquisition of psychomotor and assessment skills required for the delivery of safe nursing care. Students begin by learning clinical skills in the simulation setting and then using those skills with supervision in the clinical setting. An additional focus of this course is understanding fundamental nursing concepts as they pertain to providing safe, effective care. Prereq: ZOOL 507-508; majors only. Coreq: NURS 508. Lab. Special fee. 4 cr.

535. Death and Dying
Course encompasses peoples' responses to death throughout the lifecycle. Theories of death, dying, and grieving discussed. Students explore cultural influences, legal, and ethical dilemmas; the biopsychosocial needs of people facing life threatening situations; resources for care of the dying; death rituals; and surviving a major loss. Writing intensive. 4 cr.

595. Women's Health
Examines women's health and women's health care from historical, political, and social perspectives. Discussion of societal and health-care constraints that hinder women from achieving their full health potential. Also presents information on women's health-care practices, including the concept of self-care, and relates this to the development of educated consumerism in the health-care system. 4 cr.

606. Seminar on Professional Nursing
Individual student examination of values, attitudes, and beliefs regarding professional role and personal goal in relation to current nursing practice. Students investigate how interactions between physical and social environments affect health; and they examine the role of health professional from historical, social, political, economic, and technical viewpoints. Prereq: open to R.N. students only; permission. Special fee. 7 cr.

615. Care of the Adult
Addresses the professional nursing practice, decision making processes, strategies and interventions as they relate to the care of adults who are experiencing chronic illnesses, acute illnesses, or impending death. The perspective adopted emphasizes the functional issues of daily living that these illnesses impose and the meanings these illnesses have for adults and their families within cultural, socioeconomical, sociopolitical, physical, and personal contexts. Prereq: NURS 645, NURS majors. Special fee. 6 cr.

617. Nursing and Health Care Policy
Examination of the nature and quality of health care delivery systems and health related social programs from a nursing perspective. The role of the baccalaureate nurse directs the scrutiny of social policy at the community, state, federal, and international level. Critical thinking skills and strategies needed by professional nurses to participate in health care planning and health care consumer advocacy for improved health services emphasized. Prereq: for R.N.s with at least one year of clinical experience or permission. 3 cr.

618. Caring for People with Alterations in Mental Health
Provides an understanding of the concepts of mental health and major factors affecting human behavior and interaction. Uses specific theoretical concepts and psychosocial theories as a vehicle for supporting the person's and family's optimum state of well-being. Also emphasizes the practice of psychiatric nursing as being grounded on certain empirical, aesthetic, personal, and ethical knowledge. Through a variety of clinical experiences, the student applies mental health concepts, principles of therapeutic communication, and the nursing process in caring for individuals and families with alterations in mental health. Prereq: junior major. Special fee. 4 cr.

619. Clinical Decision Making I
To practice effectively nurses must be able to gather data, interpret its meaning, take actions based on an understanding of the data, and evaluate outcomes. They also must be aware of the processes used to reach conclusions and be prepared to revise, adapt, or reject them. The course focuses on teaching learning theory, ethical decision making, and helping clients and families deal with situational and maturational crises, using a critical thinking framework. May be repeated. Prereq: first-semester junior Nursing majors; NURS 501; 502; 508; 514. Coreq: NURS 615. Writing intensive. 4 cr.

620. Caring for the Childbearing and Childrearing Family
The family as focus for nursing practice. Introduces students to the care of young families throughout pregnancy, birth, and child-rearing periods. Examines healthy transitions and physical alterations occurring from conception through adolescence. Discusses the health needs of the young family in terms of major morbidity/mortality and contemporary issues. Experience in various clinical settings will provide opportunities for the development of professional practice roles. Prereq: junior major. Special fee. 6 cr.

622. Clinical Decision Making II
Emphasizes the clinical decision making process in the nursing care of individuals, families, and communities across the lifespan and from diverse backgrounds. Builds upon the theoretical foundation developed in 619, Clinical Decision Making I. Students strengthen expertise in developing clinical judgments, interventions, and outcome evaluations. Skills predicated upon attending to and processing relevant information from clinical situations. Students apply knowledge from clinical nursing courses in a variety of ways. Prereq: second-semester junior Nursing majors; NURS 619. 4 cr.

624. Nursing in the Community
Explores the role of community health nursing in health promotion, disease prevention, and long-term care. Analyzes contemporary community health problems with implications for community health nursing. Explores a variety of clinical and population-focused roles in primary, secondary, and tertiary prevention of health problems. Special fee. Prereq: junior major. 4 cr.

625. Nursing in the Community
Explores the role of community health nursing in health promotion, disease prevention, and long-term care. Analyzes contemporary community health problems with implications for community health nursing. Explores a variety of clinical and population-focused roles in primary, secondary,

and tertiary prevention of health problems. Open to R.N. students only, by permission. Prereq: NURS 606. Special fee. 4 cr.

626. Seminar on Community Nursing
A nonclinical course, exploring the role of community health nursing in health promotion, disease prevention, and long-term care. Analyzes contemporary community health problems with implications for community health nursing. Prereq: Open to R.N. students with five years documented community health clinical experiences only; NURS 606. 3 cr.

645. Nursing Research
Focuses on enhancing the student's ability to evaluate, read, comprehend, participate in, and apply research to the practice of nursing. Prereq: junior major. Pre- or coreq: statistics. 2 cr.

646. Research in Nursing
Explores the role of nursing research in the development of nursing knowledge, the impact of research on practice and patient care outcomes. Students are introduced to the steps of research process. Journal articles describing completed nursing research studies critiqued and the impact of findings assessed. The role of the professional nurse in identifying problems for research, in participating in research, and in acting as advocate to the research subject discussed. May be repeated. Prereq: registered nurse with at least one year of experience; permission. Pre- or coreq: statistics. 3 cr.

655. Community Health Nursing I: Population Health
Explores a variety of contemporary topics relevant to community health and community health nursing practice at the population level. The holistic and interdisciplinary nature of the diverse field of community health nursing is explored. The social, political, and economic factors influencing contemporary community health care and community health nursing in our society are discussed. Concepts of primary health care, community analysis, and diagnosis are utilized to assess a community's health status. May be repeated. Prereq: registered nurses only; NURS 606; permission. Special fee. 3 cr.

656. Community Health Nursing II: Individuals, Families, and Aggregates
Explores a variety of contemporary topics relevant to community health and community health nursing practice at the individual, family, and aggregate levels. Students have the opportunity to explore the clinical focused roles of the community health nurse in primary, secondary, and tertiary prevention of health problems in individuals, families, and aggregates at risk across the life span. Evolving roles and responsibilities of a variety of community health nurse specialties introduced. Students collaborate with multidisciplinary health professionals in planning, providing, and evaluating health services to these specific at risk populations. May be repeated. Prereq: registered nurses only; NURS 606; permission. Special fee. 3 cr.

670. Issues in Health Care of the Aged
Current concepts and issues related to study of aging from biological and sociological perspectives. Multidisciplinary study of issues relevant to the development of social policies affecting health care and delivery of services to the elderly. Open to all students. 4 cr.

695. Independent Study
In-depth study with faculty supervision. Prereq: junior standing and approval of adviser and faculty of the area concerned. May be repeated for different topics. 2–4 cr.

703. Nursing Leadership/Management and the Organizational Context
Focuses on understanding ways in which the nurse can affect the organizations in which practice occurs and ways in which the organizations affect the individual's practice. Emphasizes issues of leadership; management; power; change; motivation; and interfacing of autonomous, dependent, and interdependent nursing functions in current and future health care delivery systems. Prereq: senior in the major. 4 cr.

710. Families in Health and Illness
Seminar focuses on the family environment as a context for the experience of health and illness. Current middle-range theories and research from nursing and other disciplines analyzed for their application to family health. Public policy initiatives related to family health explored. 4 cr.

719. Professional Nursing Practice: Transitions
Provides opportunity for students to refine and integrate previously learned knowledge and skills into professional practice through a cooperatively designed learning experience/environment. Open to R.N. students only, by permission. Prereq: NURS 606. Special fee. 7 cr.

720. Professional Nursing Practice: Transitions
Provides opportunity for students to refine and integrate theory and practice from previous coursework into professional practice through a cooperatively designed learning experience. Final course in major. Special fee. 8 cr.

736. Cardiac Arrhythmias
Theory and practice of single-lead and 12-lead electrocardiography for the purposes of identification of disturbances of the cardiac rhythm; designed to provide a firm foundation for the assessment and treatment of persons experiencing disturbances of the cardiac rhythm; includes field experience. Prereq: ZOOL 507-508 or permission. 4 cr.

794. Special Topics
Specialized courses covering information not normally presented in regular course offerings. Description of topics varies. May be repeated but not duplicate areas of content. Prereq: permission. 1–4 cr.

#796. Assessment and Intervention of Addictive Behaviors
Concepts related to addictions seen in common disorders such as alcoholism, drug abuse, eating disorders, and codependency. Addresses assessment treatment, and relapse prevention. Generic concepts are expanded through specific areas of addiction. Seminar format to facilitate class participation. Prereq: junior, senior, or graduate standing. (Also offered as OT 796.) 4 cr.

797. Honors Project
Honors seminar designed to expand the knowledge and skills presented in previous honors in major courses. Focus of course is a project relevant to the discipline of nursing under the direction of a faculty adviser. Pre- or coreq: NURS 645; permission. 4 cr.

Nutritional Sciences (NUTR)

Department of Animal and Nutritional Sciences
(For program description, see page 89. For other courses, see listings under Animal Sciences, page 122.)

Professor: Samuel C. Smith, Anthony R. Tagliaferro
Associate Professors: Dennis J. Bobilya, Gale B. Carey, Joanne Curran-Celentano, Colette H. Janson-Sand
Teacher/Trainers: Carolyn Giles, Ruth A. Reilly
Extension Educators: Valerie A. Long, Catherine A. Violette

401. Introduction to the Dietetics Profession
Survey of the role and responsibilities of the dietitian. Legal and ethical considerations necessary for the student dietitian in clinical experiences. Educational and personal qualifications for specialization in dietetics. Prereq: NUTR major. 1 cr. Cr/F. (Fall semester only.)

405. Food and Society
Consideration of the cultural significance of food, emphasizing historical, psychological, social, political, and economic aspects. Also offered as ANSC 405. Writing intensive. 4 cr. (Spring semester only.)

473. Food Fundamentals
Principles and techniques of food selection, preparation, and preservation in relation to quality and acceptability. 3 cr. (Fall semester only.)

475. Nutrition in Health and Disease
Principles of human nutrition—normal and therapeutic. Focus on source of nutrients from food, digestion, absorption, and metabolism. Discussion of role of nutrients in maintenance of normal physiology, changes in nutrient requirements through the life cycle, and diet in the prevention and/or treatment of disease. 4 cr. (Fall semester only.)

476. Nutritional Assessment
Techniques in anthropometric and biochemical assessment of nutritional status with emphasis on client interviewing and nutritional evaluation in both community and clinical settings. Prereq: NUTR 475 or permission. Special fee. 3 cr. (Spring semester only.)

503. Principles of Food Service Management
Practical experience in methods of purchasing, and handling food, tools, and equipment used in quantity food preparation; lab experience in selective settings. May be taken independently of NUTR 504. Prereq: NUTR 473 or permission of instructor. 3 cr. (Fall semester only.)

504. Managerial Skills in Dietetics
Emphasizes the basic principles of managing clinical, community, and food service operations, including personnel management, in-service and on-the-job training, policies and procedures development, and financial management. 3 cr. (Spring semester only.)

510. Nutrition Education and Counseling
Principles, methods, skills and materials involved in nutrition education and counseling. Emphasis on development of educational materials and practicum skills necessary to perform as an effective nutrition counselor. Special fee. 3 cr. (Fall semester only.)

550. Food Science: Principle and Practice
Principles of food composition structure and properties and the chemical changes foods undergo in preparation and processing. Study of the laws and regulations that are applied to marketing food systems; principle and practice in food preservation. Application of scientific principles and interpretations of laboratory findings. Prereq: NUTR 473; 475; CHEM 403-404; CHEM 545-546. Special fee. Lab. 4 cr. (Spring semester only.)

600. Field Experience in Nutrition
Supervised field experience in public and private agencies with planned learning objectives related to the areas of clinical and community nutrition and food service management. Students are responsible for their own transportation; faculty member coordinates arrangements with fieldwork sites. Prereq: NUTR majors and minors only; permission; NUTR 415. May be repeated for a maximum of 6 credits. 1–4 cr. Cr/F.

646. Sports Nutrition
In-depth look at the facts and fallacies of sports nutrition for students who plan to become health professionals. Topics include protein needs for athletes, fat as fuel, carbohydrates and athletic performance, nutrition ergogenic aids, vitamin and mineral needs of athletes, fluid replacement, eating disorders, and proper training diets. Prereq: NUTR 475 or ANSC 400; KIN 620 or ANSC 511-512. Writing intensive. 4 cr.

650. Life Cycle Nutrition
Detailed analysis of nutrient requirements throughout the life cycle. Nutrient needs are evaluated in the context of their metabolic functions. Prereq: NUTR 475. 3 cr. (Spring semester only.)

699. Independent Study
Scholarly research project or supervised teaching experience in an area of the nutritional sciences under the guidance of a faculty adviser. May be repeated. Prereq: permission. 1–4 cr. Cr/F.

720. Community Nutrition
Focus on managerial processes of planning, leading, and evaluating nutrition programs and the skills and tools needed to develop and present such programs. Writing intensive. (Also offered as ANSC 720.) 4 cr.

730. Dietetics Practicum I—Foodservice Management and Community Nutrition
Supervised practical experience in the professional areas of food service management and community nutrition integrated with classroom theory and lectures. Prereq: ADA Plan IV/V verification and acceptance into the NACS AP-4 Program. 4 cr. IA.

731. Dietetics Practicum II—Clinical Nutrition
Supervised practical experience in the professional areas of dietetics and clinical nutrition integrated with classroom theory and lectures. Prereq: ADA Plan IV/V verification and acceptance into the NACS AP-4 Program. 2 cr. IA.

750/750W. Nutritional Biochemistry
Detailed analysis of the digestion, absorption, transport, and intermediary metabolism of nutrients. Nutrient requirements are evaluated in the context of their physiological and biochemical functions. Prereq: ansc 511-512; BCHM 658; or equivalents. (Also offered as ANSC 750.) Special fee. 750W is writing intensive. 4 cr.

760. Geriatric Nutrition
Emphasis on the nutritional requirements and status of the elderly in view of psychological and physiological changes in aging. Approaches for nutrition intervention and support will be addressed. Prereq: NUTR 475 or permission. (Also offered as ANSC 760.) 3 cr. (Spring semester only.)

773. Clinical Nutrition
Application of principles of normal nutrition and physiology to clinical problems; altered nutrient requirements in human disease. Prereq: basic nutrition and biochemistry or permission. Coreq: NUTR 775. (Also offered as ANSC 773.) 4 cr. (Fall semester only.)

775. Practical Applications in Medical Nutrition Therapy
Supervised practical experience in therapeutic dietetics in one of several cooperating New Hampshire hospitals. Emphasis on nutritional counseling, assessment, and instruction of patients with nutrition-related disorders. Coreq: NUTR 773. (Also offered as ANSC 775.) Special fee. 3 cr. (Fall semester only.)

780. Critical Issues in Nutrition
Critical review and analysis of controversial topics in nutrition; emphasis on developing oral and written communication skills and analytical reasoning skills. Prereq: permission. Writing intensive. (Also offered as ANSC 780.) 4 cr. (Spring semester only.)

795. Honors Thesis
A special project conducted under faculty supervision and resulting in a written honors thesis. Students must initiate discussion of the project with an appropriate faculty member. Prereq: senior major with cumulative G.P.A. of 3.20; permission. 4 cr.

Occupational Therapy (OT)

(For program description, see page 75.)

Chairperson: Alice C. Seidel
Associate Professors: Elizabeth L. Crepeau, Lou Ann Griswold, Maureen E. Neistadt, Alice C. Seidel, Barbara Sussenberger, Judith D. Ward
Assistant Professors: Jane M. Lissner, Susan C. Merrill, Shelley E. Mulligan, Douglas C. Simmons, Barbara Prudhomme White
Fieldwork Coordinator: Erlinde M. Beliveau

The following courses are for occupational therapy students; elective for others by permission of the course instructor.

410. Introduction to Occupational Therapy
Introduces students to the profession of occupational therapy. Lectures, assigned readings, in-class activities, and assignments provide students with introductory content about professional values; therapeutic use of activity; therapeutic relationships; occupational therapy treatment process; application of theory to practice; national and international organization of the profession; professional relationships and teams; and professional ethics. Selected practitioners present lectures that describe their practice setting and career development. Prereq: admitted to OT major. 4 cr.

441. Level I Fieldwork—Introduction
Designed to provide first-year OT students the opportunity to experience OT in a clinical setting. Lecture format, followed by one-week clinical placement, followed by one processing session. Faculty member coordinates fieldwork sites; students are responsible for transportation and housing; yearly professional liability insurance fee charged. Prereq: majors only. 1 cr.

500. The Behavior and Development of Children
Introduction to the biological, psychosocial, and cultural aspects of human development from birth through adolescence. Emphasis on theories that help explain human behavior; discussion of implications of developmental research. 4 cr.

501. Developmental Tasks of Adulthood
Includes the biological and psychosocial context of development. Developmental tasks as they relate to the accomplishment of prior tasks, physiological change, socioeconomic status, and psychosocial development. Prereq: child development course or permission. 4 cr.

511. Introduction to Professional Literature and Communication
Literature related to the practice of occupational therapy and the communication skills required of therapists. Emphasis on research in professional literature, scholarly writing, and professional terminology. Introduction to oral reporting, clinical observation, and documentation techniques. Special fee. Prereq: sophomore OT major. Writing intensive. 4 cr.

514. The Meaning of Human Occupation
A major assumption of occupational therapy, the importance of activity or occupation in sustaining health, provides the framework for the course. The meaning of occupation to individuals, major theories of occupation, and methods of assessing an individual's self-care, work, and leisure activities. Laboratory experiences enable the students to acquire skills in elected activity or occupation. Special fee. Prereq: OT 410. Writing intensive. 4 cr.

516. Introduction to Human Occupation
The importance of activity or occupation to sustain health provides the framework of this course. The meaning of occupation to individuals, major theories of occupation, and methods of assessing an individual's self-care, work, and leisure activities. Prereq: permission. 2 cr.

581. Concepts of Medicine and Health for Occupational Therapists
Models of health and medicine are used to determine the impact of selected diseases and disabilities on human function and occupational behavior. Students learn various approaches to studying disease or chronic disability processes. Prereq: ZOOL 507-508 or permission. 4 cr.

641. Level I Fieldwork—Observation and Interpretation
Designed to provide OT students a more in-depth exposure to OT in a clinical setting. Lecture format, followed by one-week clinical placement, followed by one processing session. Faculty member coordinates fieldwork sites; students are responsible for transportation and housing; yearly professional liability insurance fee charged. Prereq: junior majors only; OT 441. 1 cr.

682. Rehabilitation Principles for Occupational Therapists
Principles and therapeutic activities used by occupational therapists in rehabilitation and intervention programs for clients with musculoskeletal and cardiopulmonary impairments. Students learn and apply fundamental processes of clinical reasoning and intervention planning. Labs provide problem based learning activities that require application and practice of new knowledge and skills. Prereq: OT majors only; KIN 652; 653A; OT 410; 514; 581. Special fee. 4 cr.

683. Psychiatric Foundations of Occupational Therapy
Clinical psychiatric conditions presented through lecture and observations. Recognition of psychiatric symptoms, their cause, and general treatment are emphasized. Laboratory experiences develop skills in behaviorial observation and interpretation and beginning skills in clinical reasoning. Prereq: PSYC 401. 4 cr.

684. Psychiatric Foundations: Introduction to Clinical Reasoning
Provides background information on psychosocial disorders commonly seen by occupational therapists. Clinical psychiatric conditions presented through lecture and observation. Recognition of psychiatric symptoms, their cause, and general treatment emphasized. From prerequisite psychology and occupational therapy courses, students are expected to bring a basic knowledge of the physical and psychosocial aspects of human development including the theories of Freud, Rogers, Erikson, Maslow, Sinner, and Piaget. No credit if credit earned for OT 683. Prepreq: PSYCH 401; 561; permission. 1 cr.

694. Neurodevelopment: Assessment and Intervention
Provides an understanding of normal and abnormal neurological development. Students enhance their observation and assessment skills as they apply the course content to children with and without disabilities. Addresses common frames of reference used by pediatric occupational therapists within the context of the environments of home, preschool, school, and clinical settings. Corequisite lab provides hands-on experience for application of knowledge. Prereq: KIN 706; child development. Lab. 4 cr.

695. Independent Study
In-depth study with faculty supervision. Prereq: junior standing in OT major; approval of major adviser and faculty of area concerned. May be repeated for a maximum of 8 credits. 2–4 cr. Letter grading unless Cr/F requested.

723. Group Process in Occupational Therapy
Theoretical and applied dimensions of group process in both clinical and organizational settings. Skills in group planning, implementation, and evaluation for direct service roles. Indirect service roles including program development, collaborative leadership, and teamwork studied. Students actively participate in simulated group experience. Prereq: OT senior standing. Special fee. 2 cr.

725. Occupational Therapy in Mental Health Service Delivery Systems.
Addresses trends, changes, and new opportunities for occupational therapy practice in mental health. The importance and role of theory in OT mental health services. Development of knowledge and skills in screening, assessment, and planning OT interventions for direct service roles. Indirect service roles such as program development and consultation are also covered. Experiential learning opportunities in community agencies enable students to acquire knowledge of networks of available resources. Prereq: OT 683. Lab. 4 cr.

733. Treatment in Adult Neurodysfunction
Presents disorders of the adult nervous system. Applies beginning clinical reasoning skills to assessment, setting measurable objectives, and selection of intervention strategies for this population. Prereq: KIN 652; 653A; 706; OT 682; 694. Special fee. Lab. 4 cr.

774. Occupational Therapy in School Systems
Current issues of practice in school systems. Explores unique features of occupational therapy in schools, interrelationships among educational personnel, and unique skills necessary for effective service delivery. Prereq: OT 694. 1 cr.

786. Management of Occupational Therapy Services
Organization and administration theory applied to the field of practice. Knowledge and abilities necessary to assume administrative responsibilities for services that reflect the standards and ethics of the profession. Prereq: OT 733 or permission. 2 cr.

788. Transitions: Student to Professional
Exploration of role changes involved in leaving the academic world and entering the realm of professional and clinical settings. Role delineation, effective communication, supervisor/supervisee relationship, and career planning are addressed. Prereq: OT 733 or permission. 2 cr.

791. Senior Honors Thesis
Completion of a research proposal based on a topic of relevance to the occupational therapy profession. Development of knowledge and skills in receiving and critiquing research and professional literature; research design and methodology; and the development of a research proposal. Required for graduation with honors in the major. 4 cr.

795. Special Topics
Explores areas related to occupational therapy theory, practice, and/or research. May repeat to 12 credits but not duplicate subject areas. Prereq: permission. 2–4 cr. Cr/F.

#796. Assessment and Intervention of Addictive Behaviors
Concepts related to addictions seen in common disorders such as alcoholism, drug abuse, eating disorders, and codependency. Addresses assessment, treatment, and relapse prevention. Generic concepts are expanded through specific areas of addiction. Seminar format to facilitate class participation. Prereq: junior, senior, or graduate standing. (Also offered as NURS 796.) 4 cr.

797. Psychosocial Dysfunction Fieldwork
Supervised field experience in off-campus setting for three-month period. Prereq: completion of senior year OT requirements or permission. Must be completed successfully to qualify to take professional certification exam. This is a multiterm course; an IA grade will be given at the end of the first semester. Special fee. 0 cr.

798. Physical Dysfunction Fieldwork
Supervised field experience in off-campus setting for three-month period. Prereq: completion of senior year OT requirements or permission. Must be completed successfully to qualify to take professional certification exam. This is a multiterm course; an IA grade will be given at the end of the first semester. 0 cr.

799. Special Area Fieldwork
Supervised field experience in off-campus setting for three-month period. Prereq: completion of senior year OT requirements or permission. Must be completed successfully to qualify to take professional certification exam. This is a multiterm course; an IA grade will be given at the end of the first semester. 0 cr.

799A. Continuing Fieldwork
Students who have previously registered for OT 797, 798, or 799 and have not completed their fieldwork must register for OT 799A. Prereq: permission. 0 cr. Cr/F. IA.

Ocean Engineering (OE)

(For program description, see page 102.)

690. Introduction to Ocean Engineering
Survey of engineering applications in the ocean environment. Topics vary and include: hydrodynamics, waves, tides, underwater sound, instrumentation, diving technology, marine geomechanics, and naval architecture. Taught by a team of faculty members from engineering departments. Prereq: PHYS 408; MATH 527. Special fee. 4 cr.

744. Corrosion
Three-part course. First part reviews and develops basic concepts of electrochemistry, kinetics, and measurement methods. Second part covers details of specific corrosion mechanisms and phenomena including passivity, galvanic corrosion, concentraction cell corrosion, pitting and crevice corrosion, and environmentally induced cracking. Third part focuses on the effects of metallurgical structure on corrosion, corrosion in selected environments, corrosion prevention methods, and materials selection and design. Prereq: CHEM 404 or 405; ME 561 or permission. Special fee. Lab. 4 cr.

710. Ocean Measurements Lab
Measurements of fundamental ocean processes and parameters. Emphasis on understanding typical offshore measurements, their applications, and the use of the acquired data, in terms of the effects on structures and processes in the ocean. 4 cr.

753. Ocean Hydrodynamics
Fundamental concepts of fluid mechanics as applied to the ocean; continuity; Euler and Navier-Stokes equations; Bernoulli equation; stream function, potential function; momentum theorem; turbulence and boundary layers are developed with ocean applications. Prereq: permission. 3 cr.

754. Ocean Waves and Tides
Introduction to waves: small amplitude, linear wave theory, standing and propagating waves, transformation in shallow water, energy and forces on structures, generation by wind and specification of a random sea, long waves with rotation, and in-

ternal waves. Introduction to tides: description of tides in ocean tidal generation forces, equilibrium tide, and tidal analysis. Lab/project: field and lab measurements with computer analysis. Prereq: PHYS 407-408; MATH 527;/or permission. (Also offered as EOS 754.) Lab. 4 cr.

756. Principles of Naval Architecture and Model Testing
Fundamentals of naval architecture presented, including hydrostatics, basics of resistance and propulsion, sea keeping and scaling. Concepts applied in experiments utilizing the tow/wave tank and associated instrumentation. Prereq: ME 608 or equivalent; ME 627 or equivalent. Special fee. 4 cr.

757. Coastal Engineering and Processes
Introduction to small amplitude and finite amplitude wave theories. Wave forecasting by significant wave method and wave spectrum method. Coastal processes and shoreline protection. Wave forces and wave structure interaction. Introduction to mathematical and physical modeling. (Also offered as CIE 757; ME 757.) Prereq: fluid dynamics or permission. 3 cr.

#781. Physical Instrumentation
Analysis and design of instrumentation systems. Sensors, circuits, and devices for measurement and control. Elements of probability and statistics as applied to instrument design and data analysis. Transmission, display, storage, and processing of information. The design implementation, testing, and evaluation of a relevant instrument system is an integral part of the course. Prereq: senior standing in EE or equivalent; EE 652; and permission. Lab. 4 cr.

785. Underwater Acoustics
Vibrations, propagation, reflection, scattering, reverberation, attenuation, sonar systems, ray and mode theory, transducers and arrays, signal analysis. Prereq: permission. 4 cr.

795. Special Topics in Ocean Engineering
New or specialized courses and/or independent study. May be repeated for credit. 2–4 cr.

Oceanography

(For program description, see page 102.)

Philosophy (PHIL)

(For program description, see page 43.)

Chairperson: Willem A. deVries
Professors: Paul T. Brockelman, Willem A. deVries, Robert C. Scharff, Duane H. Whittier, Charlotte Elizabeth Witt
Associate Professors: Drew Christie, R. Valentine Dusek, Paul McNamara, Timm A. Triplett, Kenneth R. Westphal
Assistant Professors: Ruth J. Sample, Lisa C. Tessman
Lecturer: Jennifer K. Armstrong

Introduction to Philosophy: The 400-level courses (except 495) listed below are all introductions to philosophy; students should select among them according to interest. See course descriptions posted in department for detailed information on course offerings.

401/401W. General Introduction to Philosophy
Depending upon the instructor, the emphasis will be on basic philosophic problems, recurrent types of philosophies, or selected readings from the history of philosophy. 401W is writing intensive. 4 cr.

412. Beginning Logic
Principles of reasoning and development of symbolic techniques for evaluating deductive and inductive arguments. 4 cr.

417. Philosophical Reflections on Religion
Introductory philosophy of religion. To help students become critically aware of philosophical issues involved in various forms of religious belief and some of the persisting philosophical understandings of those issues. 4 cr.

421. Philosophy and the Arts
Contemporary philosophic concerns and perspectives as reflected in one or more of the arts (literature, theatre, film, music, plastic art). Writing intensive. 4 cr.

424. Science, Technology, and Society
Consideration of the scientific endeavor and its social import from a philosophical perspective. 4 cr.

430. Society and Morals
Critical study of principles and arguments advanced in discussion of current moral and social issues. Possible topics: violence, rules of warfare, sexual morality, human rights, punishment, abortion. 4 cr.

435. The Human Animal
Philosophy of biology and the evolutionary process. Readings of scientists and philosophers' commentary on scientists. Examination of the differences between scientific debate and philosophic debate. Philosophical study of scientific theory stressing humans' place in the natural world and the ethical implication of humans as natural beings in the evolutionary process. 4 cr.

436/436W. Social and Political Philosophy
Examination of social and political thought that may include texts from ancient through contemporary times, addressing topics such as natural rights, revolution, law, freedom, justice, power. Questions may include: What is a community, and how are individuals related to communities? Can any particular form of government be morally justified, and if so, what kind of government? Can anarchism work? Is there something wrong with a society in which there is private ownership of property? What is oppressive? What is freedom, and are we free? What roles should different forms of power play in a society? Could and should there be a genderless society? Is ethnic diversity valuable? 436W is writing intensive. 4 cr.

447. Computer Power and Human Reason
The historical origins of the science of computation. The implications of the nature of information-processing for understanding the mind-body relation. Examination of the possible social, economic, and educational consequences of the computer revolution. 4 cr.

450. Ecology and Values
Focus on historical and contemporary philosophies of nature and their effects on human interaction with the environment. Issues include obligations to future generations and to animals, plants, and ecosystems; moral limits on consumption and reproduction; and the existence of objects of intrinsic value. Specific topics may include species loss and biological diversity, population growth, changes in the atmosphere, energy use, and sustainable development. 4 cr.

495. Tutorial Reading
Basic introductory reading under faculty direction on topics of philosophical importance. Books offered for tutorial reading may be in any area the instructor chooses or on independent study basis. Prereq: permission. Variable to 4 cr.

496. Philosophic Topics
Introductory-level seminar in specific topics or problems (e.g., death, love, friendship) considered from a philosophic point of view. 4 cr.

For special introductory courses in the area of applied philosophy, see Fundamentals of Applied Philosophy, page 198.

500. Philosophy Workshop
Introduction to methods of studying philosophical texts. Emphasis on reading philosophical texts and arguments for comprehension, and on writing philosophically with accuracy and clarity. Open to PHIL majors only (PHIL minors may enroll if they receive special permission). Writing intensive. 4 cr.

510. Philosophy and Feminism
Focus on the philosophical issues in feminism primarily through the work of historical and contemporary philosophers. Topics include the question of the nature of women, feminism as an ethical and political theory, feminism as an exploration and transformation of the self, feminism as a philosophical methodology, the institutions of marriage and motherhood. Writing intensive. 4 cr.

520. Introduction to Eastern Philosophy
Major Eastern traditions of philosophy. Concentration on Indian, Chinese, and Japanese systems may vary from semester to semester. 4 cr.

525. Existentialism
Readings from existential philosophy and literature. Selections may be drawn from the works of Kierkegaard, Nietzsche, Heidegger, Sartre, Camus, de Beauvoir, Buber, Bultman, Merleau-Ponty, Tillich, Kafka, and others. 4 cr.

530. Moral Philosophy
Critical examination of the development of philosophical thinking regarding human values, rights, and duties. 4 cr.

540. Philosophy of Race and Racism
Investigation of the concept of race and how different understandings of race underlie racist and antiracist politics; exploration of how racism is interlocked with gender, economic, and other forms of oppression. Questions may include: What is racism? Do racial categories (such as black, white, latino) have any scientific basis, or are they socially constructed? If race is socially constructed, is it still "real" and should it be treated as such? Should public policies be "color-blind" with respect to race? Is whiteness a problematic racial identity, and

what can white people do about it? How is racism built into the structure of the state? Can popular racial discourse serve to support racist policies or attitudes even when it does not contain explicitly racist claims? 4 cr.

550. Symbolic Logic
Principles and techniques of modern logic. Topics: propositional logic, truth tables, predicate logic, and, time permitting, basic metatheorems. Prereq: PHIL 412. 4 cr.

570. Ancient Philosophy
Development of Western philosophy from its beginnings in Greece to the Roman period, with particular emphasis on the thought of Plato and Aristotle. 4 cr.

571. Medieval Philosophy
Philosophical thought of the Middle Ages from inception in the late Roman period with thinkers such as Plotinus and Augustine through the late medieval speculative mysticism of such figures as Meister Eckhart. Writings of Augustine and Thomas Aquinas. 4 cr.

574. 17th-Century Philosophy
The rise of modern science, the discoveries in the new world, disputes in both religious and political ideology, and the ability to disseminate ideas broadly via print all contributed to a tremendous flowering of philosophy in 17th century Europe. This course traces the birth and development of distinctively modern philosophy in the thought of such creative minds as Galileo, Descartes, Hobbes, Leibniz, Spinoza, and Locke. 4 cr.

575. 18th-Century Philosophy
The enlightenment proclaimed the rule of reason in knowledge and in human affairs. In the 18th century this program was itself subjected to rigorous rational scrutiny. Some drew deeply skeptical conclusions from this critique; others vindicated reason, though within new limits; and still others abandoned reason in a return to feelings and the emotions. This course examines selected works among the writings of Berkeley, Hume, Rousseau, Reid, Kant, and others. Prereq: PHIL 574 or permission. 4 cr.

#600. Philosophy through Literature
Philosophical implications of representative literary works, read in tandem with philosophical works or articles. The content will vary. The literary works explored may be drawn from ancient times through modern times. For examples, the classic Greek tragedy *Antigone* might be explored for its implications regarding moral, political and feminist philosophy, or the philosophical implications of an anti-utopian contemporary work like *Brave New World* might be explored, or short stories drawn from science fiction and other speculative fiction might be used to explore the possibility of time travel or of machines with mental lives. Writing intensive. 4 cr.

616. 19th-Century Philosophy
19th century philosophy developed from two profound sources: Kant projected a complete philosophical system of reason, while historical and anthropological studies stressed the variability and gradual development of cultural perspectives. This contrast posed fundamental issues about how reason, truth, and knowledge relate to time, history, and cultural diversity. These issues were addressed by heterogeneous philosophical systems, including Hegel's idealist rationalism; Schopenhauer's pessimism; Marx's revolutionary materialism; Kierkegaard's reassertion of religious faith; Nietzsche's critique of reason, religion, and morality; the Positivism of Comte, Mill, and Mach; American Pragmatism; and philosophical responses to Darwin and to Freud. This course examines selected themes and authors from this provocative century. Prereq: PHIL 574 or 575;/or permission. Writing intensive. 4 cr.

618. Recent Anglo-American Philosophy
Philosophical movements such as analytic philosophy, pragmatism, and process philosophy. Typical readings: Russell, Wittgenstein, James, Dewey, Whitehead. Prereq: two courses in history of philosophy (one of which may be concurrent);/or permission. Writing intensive. 4 cr.

620. Recent European Philosophy
Major developments and themes. Representative figures: Jaspers, Husserl, Heidegger, Bloch, Lukacs, Habermas, Bergson, Marcel, Sartre, Merleau-Ponty, Ricoeur, Kolakowski, etc. Prereq: two courses in history of philosophy (one of which may be concurrent);/or permission. Writing intensive. 4 cr.

630. Philosophy of the Natural Sciences
Philosophical problems raised by the physical and biological sciences; role of mathematics in science, nature of scientific concepts of space and time, relations of science to common sense, relation of theory to observation, logic of scientific discovery, nature of historical changes in scientific worldview, relation of logic of science to the psychology, and history of science. Writing intensive. 4 cr.

635. Philosophy of Law
Systematic study of salient features of legal systems. Possible topics: nature of law; concept of legal validity; law and morality; individual liberty and the law; legal punishment; legal responsibility and related concepts (for example, legal cause, harm, mens rea, negligence, strict liability, legal insanity). Writing intensive. 4 cr.

650. Logic: Scope and Limits
Close examination of the scope and limits of formal systems. Variable content: consistency and completeness of predicate logic; Gödel's proof and the formalization of mathematics; modal and deontic logic; set theory; finite automata and computing machines; and formal semantics. Prereq: PHIL 550; MATH 531;/equivalents or permission. 4 cr.

699. Senior Thesis
Tutorial work for philosophy department candidates for "Commendation" and "Honors." Prereq: two courses in history of philosophy, senior standing, and permission. Writing intensive. 4 cr. Cr/F.

701. Topics in Value Theory
Philosophical inquiry into the nature of value. Topics may include the grounds of right and wrong, various conceptions of morality, the nature of good and evil, theories about the meaning of life, the nature of the beautiful. Prereq: permission. Writing intensive. 4 cr.

702. Topics in Metaphysics and Epistemology
Advanced study in one or more of the following topics: nature of reality, relationship of thought and reality, nature of knowledge and perception, theories of truth. Prereq: two courses in history of philosophy;/or permission. Writing intensive. 4 cr.

#710. Philosophy of Religion
Philosophic nature and significance of religious experience; historical and systematic analysis of such traditional issues as the nature of faith, relation of faith to reason, arguments concerning the existence and nature of God, the problem of evil, the relationship of religion and morality, and the relationship of religion and science. Prereq: two courses in history of philosophy;/or permission. Writing intensive. 4 cr.

#720. Philosophical Psychology
Philosophical perspectives and problems concerning human nature or the human condition; e.g., the nature of "self," human action, the body-mind problem, freedom of the will, the meaning of "person," the nature of behavior, etc. Prereq: two courses in history of philosophy;/or permission. Writing intensive. 4 cr.

#725. Philosophy of the Social Sciences
Nature of explanation and understanding in the social sciences. Similarities and differences between the social and physical sciences; claims of objectivity and of subjectivity in the social sciences; role of values in the social sciences. Prereq: two courses in history of philosophy;/or permission. Writing intensive. 4 cr.

735. Major Figures in Philosophy
Content variable. In-depth examination of a major figure (e.g., Aristotle, Kant, Heidegger) or movement (logical positivism, phenomenology, feminism, etc.). Prereq: two courses in history of philosophy;/or permission. Writing intensive. 4 cr.

#745. Philosophy of Language
Contemporary philosophical studies of the nature of meaning and structure of language. Prereq: two courses in history of philosophy;/or permission. Writing intensive. 4 cr.

750. Philosophy of History
Nature of historical knowledge, efforts to discover patterns of meaning in the past. Prereq: two courses in history of philosophy;/or permission. Writing intensive. 4 cr.

755. Environmental Ethics
Exploration of moral issues, principles, and perspectives involved in human behavior toward, and treatment of, the natural environment. Various historical and contemporary ethical perspectives compared and evaluated, e.g., utilitarianism, natural law tradition, deep ecology, anthropocentrism, ecofeminism, as well as other social and religious approaches. For graduate students and advanced undergraduates. Prereq: one course on environmental issues (PHIL 450 or EC 635) or permission. Writing intensive. 4 cr.

780. Special Topics in Philosophy
Advanced study of special topics: a problem, figure, or movement in the history of philosophy; or selected issues, thinkers, or developments in contemporary philosophy. Prereq: two courses in history of philosophy;/or permission. Writing intensive. 4 cr.

795, 796. Independent Study
For students who are adequately prepared to do independent, advanced philosophical work; exten-

sive reading and writing. Before registering, students must formulate a project and secure the consent of a department member who will supervise the work. Conferences and/or written work as required by the supervisor. Writing intensive. 1–4 cr.

798–799. Honors Thesis
Open only to philosophy majors in the University Honors Program. Students writing an honors thesis must take both of these courses, in consecutive semesters, under the supervision of two faculty advisers. Students are required to give an oral defense of their thesis. Prereq. for 799: satisfactory grade on written work in 798. Writing intensive. 4 cr.

Fundamentals of Applied Philosophy

The following are introductory courses on the fundamentals of philosophy in practice. Special emphasis is placed on identifying and reflecting on philosophical issues that arise in the context of one's professional as well as everyday life. They are designed to interest those who wish to examine the broader philosophical implications of their chosen professional activity and also those who share the awareness that, in today's world, a systematic value-orientation must complement one's scientific knowledge and skills.

447. Computer Power and Human Reason
(For course description, see page 196.)

660. Law, Medicine, and Morals
Critical examination of the diverse legal and moral issues facing the profession of health care. Variable topics. Possible topics: duty to provide care; nature of informed consent to treatment; problems of allocating limited health-care resources (e.g., withdrawal of life-support systems, quality-of-life decisions, etc.); patient's right to confidentiality; problems relating to involuntary preventive care (e.g., involuntary sterilization, psycho-surgery, etc.). Writing intensive. 4 cr.

#683. Technology: Philosophical and Ethical Issues
The bases of modern technology in, and its impact upon, people's philosophic conceptions of themselves and their world. Ethical, social, political, and ecological implications of technology. Risk and benefit criteria. Technological and humanistic philosophies of life. Writing intensive. 4 cr.

Physics (PHYS)

(For program description, see page 65.)

Chairperson: L. Christian Balling
Professors: Roger L. Arnoldy, L. Christian Balling, John R. Calarco, Edward L. Chupp, John F. Dawson, Olof Echt, Jochen Heisenberg, F. William Hersman, Joseph Hollweg, Richard L. Kaufmann, Robert H. Lambert, Martin A. Lee, Eberhard Möbius, James M. Ryan, Harvey K. Shepard, Robert E. Simpson, Roy B. Torbert, John J. Wright
Research Professors: Terry Forbes, W. T. Vestrand
Associate Professor: Dawn C. Meredith
Research Associate Professors: David J. Forrest, Philip A. Isenberg, Lynn M. Kistler, Mark L. McConnell, Jack M. Quinn
Research Assistant Professors: Mark B. Leuschner, Kristina A. Lynch

401–402. Introduction to Physics I and II
Broad survey of classical and modern physics. Designed to enable students to appreciate the role of physics in today's society and technology. Emphasis on the fundamental laws of nature on which all science is based, with some examples of interest to biologists. Knowledge of high school algebra, geometry, and trigonometry essential. Special fee. Lab. 4 cr. each.

#405. Concepts of Physics
Descriptive course investigating a limited number of important physical systems. Emphasis on how the system is to be investigated and the patterns in which the results fall. Intuitive concepts used in investigations traced into their application in modern physics. Patterns of thought in physics related to patterns of thought in liberal arts. Recommended for liberal arts juniors and seniors. 4 cr. (Not offered every semester.)

406. Introduction to Modern Astronomy
Descriptive coverage of contemporary astronomical and astrophysical techniques with a review of current knowledge and theories concerning the solar system, galaxies, and the universe. Recommended for liberal arts and beginning science students. Knowledge of high school algebra is assumed. Special fee. Lab. 4 cr.

407–408. General Physics I and II
Introductory course emphasizing mechanics, heat, sound, and electromagnetism. Recommended for the student specializing in science and engineering. Prereq: thorough knowledge of algebra, geometry, and trigonometry; MATH 425 for 407; MATH 426 for 408, or taken concurrently. Students may not receive credit for both 401 and 407 (or 402 and 408). Special fee. Lab. 4 cr. each.

412. Technical Physics
Introductory course emphasizing the fundamentals of mechanics, heat, electricity, and other subjects underlying modern machinery and instruments. Recommended for Thompson School students. Prereq: algebra and trigonometry. Lab. 4 cr.

505. General Physics III
Electromagnetic waves, geometrical and physical optics, relativity, atomic physics, elementary quantum mechanics, molecular physics, and nuclear physics. Prereq: PHYS 407-408; MATH 425, 426. Special fee Lab. 4 cr.

508. Thermodynamics and Statistical Mechanics
Classical and statistical approach to thermodynamics, kinetic theory. Prereq: PHYS 407-408, 505 or equivalent; MATH 528. 4 cr.

605. Experimental Physics I
Circuit design with passive and active elements including transistors and operational amplifiers; electrical measurements for experimental physics; digital electronics, microprocessors, and interfacing techniques. Prereq: PHYS 408, 505; MATH 527 or taken concurrently. Lab. 5 cr.

615. Introduction to Mathematical Physics
Application of mathematical analysis to physics, including complex numbers, multiple integrals, vector analysis, and Fourier series. Prereq: MATH 425-426; 527, and 528 or taken concurrently. 4 cr.

616. Physical Mechanics
Analytical treatment of classical mechanics covering the dynamics of particles and rigid bodies, at an intermediate level. Prereq: PHYS 407; MATH 527-528 (or taken concurrently); PHYS 615. 4 cr.

701–702. Introduction to Quantum Mechanics I and II
Nonrelativistic Schroedinger equation, the hydrogen atom, applications to atomic and nuclear structure. Prereq: PHYS 615-616; MATH 527, 528; MATH 646 desirable; permission. 4 cr. each.

703-704. Electricity and Magnetism I and II
Foundation of electromagnetic theory; electrostatics, dielectric theory, electromagnetism, magnetic properties of matter, alternating currents, Maxwell's field theory. Prereq: PHYS 615; MATH 527, 528; MATH 646 desirable; permission. 4 cr. each.

705. Experimental Physics II
Modern physics experiments and special project problems assigned to individual students. Prereq: PHYS 605; senior standing in physics. Lab. Writing intensive. 4 cr.

#707. Computational Physics
Application of numerical methods to physics, including integration of ordinary and partial differential equations, matrix methods, Fast Fourier transforms, and quadrature. Prereq: knowledge of a high-level programming language; MATH 527, 528; PHYS 407-408, 505, and 615. 4 cr. (Not offered every year.)

#708. Optics
Geometrical optics, electromagnetic theory of light, interference, diffraction, polarization, related phenomena and nonlinear optics. Prereq: PHYS 615, 616; MATH 527, 528; MATH 646 recommended. Lab. 4 cr.

710. Introduction to Modern Astrophysics
Review of the sun, stars, Milky Way, external galaxies, and expansion of the universe. Recent discoveries of radio galaxies, quasi-stellar objects, cosmic black-body radiation, x rays, and gamma rays precede a discussion of Newtonian and general relativistic cosmological models, steady-state/big-bang theories, and matter-antimatter models. Prereq: PHYS 616; MATH 527 or permission. 4 cr. (Offered if sufficient demand.)

712. Physics of the Ionosphere
Introduces basic plasma physics using a case study of the Earth's ionosphere and its connection to both the upper atmosphere and to the Earth's magnetosphere. Topics include single particle motion, fluid and kinetic descriptions of ionospheric plasma, wave propagation, and instabilities. Prereq: PHYS 408; PHYS 703 or EE 603;/or permission. (Also offered as EOS 712.) 4 cr.

718. Introduction to Solid State Physics
Theory and experiment underlying the behavior of solids. Transport theory, surface studies, and the interaction of radiation and matter. Operatinn of semiconducting and superconducting devices and lasers. Prereq: PHYS 615; 616; 701. 4 cr. (Offered if sufficient demand.)

720. Nuclear Physics
Nuclear phenomenology, reactions, models, radiation, interaction of radiation with matter; accelerators; properties and interactions of elementary particles; symmetries and symmetry breaking; standard model. Prereq: PHYS 702, 704, or permission of instructor. 4 cr.

#754. Introduction to Scientific Computing
Introduction to the tools and methodology of scientific computing via the examination of interdisciplinary case studies from science and engineering. Emphasis on numerical approaches to solving linear systems, eigenvalues-eigenvector problems, and differential equations. Problems solved on various hardware platforms, using a combination of software and data visualization packages. Prereq: linear algebra, differential equations, intro to programming;/or permission. (Also listed as MATH 754, CS 754.) Lab. 4 cr.

#791. Special Topics
Any selected topics not covered sufficiently in a general course may be studied. May be repeated to 8 credits. 4 cr.

795. Independent Study
Individual project under direction of a faculty adviser. Prereq: department permission. 1–8 cr.

Plant Biology (PBIO)

(For program description, see page 89.)

Chairperson: Robert O. Blanchard
Professors: Robert O. Blanchard, Garrett E. Crow, George O. Estes, Curtis V. Givan, J. Brent Loy, William E. MacHardy, Arthur C. Mathieson, Subhash C. Minocha
Adjunct Professor: Walter C. Shortle
Associate Professors: Alan L. Baker, Thomas M. Davis, Wayne R. Fagerberg, Leland S. Jahnke, Anita S. Klein, Thomas D. Lee, Christopher D. Neefus, James E. Pollard, John M. Roberts
Adjunct Associate Professors: Rakesh Minocha, Kevin T. Smith, Janet R. Sullivan
Assistant Professors: Paul R. Fisher, Estelle M. Hrabak
Extension Educators: Alan T. Eaton, William G. Lord, Cheryl A. Smith, Stanley R. Swier

400. The Power of Plants
Global experience of human interactions with plants and ways in which plants have contributed to the development and flourishing of human societies. Includes role of plants in providing sustenance, clothing and shelter, quest for spices and the historical consequences of plant explorations and exploitations, the power to heal or kill, plants in mythology and spiritual endeavors, plants that alter consciousness, plant diseases and human history, plants as energy for society, and the Green Revolution—global change and feeding the world in the future. Special fee. Lab. 4 cr.

401. Plant Biology Orientation
Overview of plant biology research and teaching facilities; introduction to research, extension, and educational functions within the department; career opportunities in plant biology. Required of all plant biology majors. 1 cr. Cr/F.

407. Sustainable Gardening
Sustainability issues related to growing of ornamental plants and vegetables. Practical gardening techniques based on ecological principles. Composting, garden design, nonchemical management of pests and diseases, and plant culture. Hands-on labs and field trips to innovative gardens and farms. An introductory course for plant biology and non-major students. Special fee. Lab. 4 cr. (Summer only.)

412. Introductory Botany
Plants in their natural environments: their structure, function, growth, reproduction, and evolutionary diversity. Special fee. Lab. 4 cr.

421. Concepts of Plant Growth
Fundamentals underlying plant growth and response in natural and modified environments. Special fee. Lab. 4 cr.

501. Basic Biochemistry
Fundamentals of general biochemistry and molecular biology for students in majors not requiring the biology core, e.g., health sciences, agricultural sciences, environmental biology. Lectures and discussion. (Will not substitute for BCHM 658-659, BCHM 751-752). Prereq: CHEM 403-404 recommended, or permission. (Not open to first-year students.) 3 cr.

#503. Introduction to Marine Biology
A course emphasizing the organization of marine biological communities. Various marine environments-pelagic, benthic, temperate, tropical-and their characteristic communities. Major emphasis on the approaches (e.g., analysis of energy flow and predator-prey interactions) used to analyze marine communities as well as the sampling techniques employed for each approach and the characteristic habitat type. Prereq: BIOL 411-412. Special fee. Lab. Writing intensive. (Also offered as ZOOL 503.) 4 cr.

546. Plants, Soils, and Environment
Plant, soil, and environment relationships under natural and modified conditions with emphasis on soils as the foundation resource for plant production. Principles and practice of organic and conventional culture to sustain and improve soils/crops. Contemporary activities impacting soils as part of ecosystems, particularly waste management where urban and rural areas meet. Prereq: CHEM 403 or permission. Special fee. Lab. 4 cr.

547. Environmental Horticulture
Effects of environmental factors such as nutrition, light, and temperature on plant growth and development. Hands-on learning of a scientific approach to plant production, with an emphasis on producing high-quality greenhouse plants. Diagnosis of plant problems related to environmental factors. Issues of environmental quality related to intensive horticultural production. Prereq: one year of biological science. Special fee. 4 cr.

557. Small Fruit Crop Management
Management strategies for a wide variety of small fruit crops appropriate for growing in the United States: soils, nutrition, climatic considerations, integrated pest management, marketing, and economics. 2 cr.

565. Turf Management
Adaptation and management of fine turf grasses for recreational, aesthetic, and functional use. Lab. 4 cr.

566. Systematic Botany
Scientific basis of plant taxonomy and the identification and classification of major plant families, native trees, shrubs, and wild flowers. Field trips, plant collection. Prereq: BIOL 412 or PBIO 412 . Lab. 4 cr.

572. Plant Propagation
Sexual and asexual propagation of horticultural plants. Prereq: BIOL 421,/equivalent or permission. Special fee. Lab. 4 cr.

600. Field Experience
A supervised experience providing the opportunity to apply academic experience in settings associated with future professional employment and/or related graduate opportunities. Must be approved by a faculty adviser selected by the student. May be repeated to a maximum of 8 credit hours. Prereq: permission. 1–4 cr. Cr/F.

612. Plant Genetics and Reproduction
Introduction to plant domestication, Mendelian inheritance, plant reproduction, biochemical basis of inheritance, plant breeding, and biotechnology of crop plants. Prereq: CHEM 403; PBIO 412 or equivalent. Will not satisfy biology core requirement for genetics. 4 cr.

625. Introduction to Marine Botany
Life history, classification, and ecology of micro- and macroscopic marine plants, including phytoplankton, seaweed, and salt marsh plants, and the interactions between humans and marine plant communities. Occasional Saturday morning field trips. Prereq: BIOL 412 or PBIO 412 or permission. Special fee. Lab. 4 cr.

651. Plant Pathology
Nature, symptomatology, etiology, epidemiology, and control of important plant diseases. Prereq: PBIO 412, BIOL 411-412, or equivalent. Lab. 4 cr.

652. Vegetable Crops
Technology and systems for producing and marketing vegetables locally and nationally; study of characteristics of specific crops and of their response to environment. Prereq: PBIO 421 or equivalent. 4 cr. (Not offered every year.)

655. Tree Fruit Management
Management systems for the major tree fruit crops grown in the northeastern United States. Emphasis on integrated orchard management and environmental considerations, planting systems, tree training, nutrition, pest management, and marketing and economics. Prereq: 412 or 421 or equivalent, or permission. Writing intensive. 3 cr.

668. Summer Flora of New Hampshire
Study of the flora of New Hampshire with an in-depth look at the major vegetation types. Fieldwork will include trips to study flora of forests, dunes, salt marshes, swamps, bogs, lakes, ponds, streams, and alpine. Prereq: basic botany or permission. Field trips. Special fee. 4 cr. (Summer session only.)

#678. Ornamental Plants
Identification, culture, and use. Prereq: PBIO 566 or equivalent. Lab. 4 cr.

682. Sustainable Food Systems
Resource use in the food chain. Historical perspective of traditional management and sustainability.

Genetic and physiological basis for improved resource use in plant/animal systems. Resource depletion and opportunities for recovery/substitution. Comparative analysis of enterprises in terms of profitability. Socioeconomic and ethical issues associated with technological innovation. Field trips. Special fee. Lab. 4 cr. (Not offered every year.)

689. Herbaceous Landscape Plants
Production and landscape use of annuals, herbaceous perennials, and flowering bulbs. Hands-on learning of production aspects include scheduling, environmental effects on flowering, overwintering, and integrated pest management. Learn principles of landscape design by developing a plan and installing a real landscape. Prereq: PBIO 547 and 566, or permission. Lab. 4 cr.

701. Plant Physiology
Structure-function relationship of plants, internal and external factors regulating plant growth and development, plant hormones, plant metabolism, water relations, and mineral nutrition. Prereq: PBIO 412 or PBIO 421 or BIOL 411-412; one year of college chemistry (e.g., CHEM 403-404); PBIO 501 or permission. 3 cr.

702. Plant Physiology Laboratory
Analytical techniques for plant physiology, effects of growth regulators on plant growth and development, cell and tissue culture, enzyme kinetics, and plant water relations. Pre- or coreq: PBIO 606. Special fee. 2 cr.

703. Evolutionary Survey of the Plant Kingdom
Evolutionary origins of the green photosynthetic plants, as seen in living groups and the fossil record; their roots in the protista; the major trends of evolutionary specialization in form, structure, and reproductive mechanisms linking the major divisions and culminating in the flowering plants. Prereq: BIOL 412 or PBIO 412. Lab. 5 cr.

706. Biology of Weeds
Ecology and reproductive biology of weed species. Dormancy and germination, dispersal, and patterns of weed establishment. Physiology and biochemistry of herbicides. Genetic engineering and environmental issues. Prereq: BIOL 411-412 or PBIO 412; CHEM 403-404. 2 cr.

708. Biology of Weeds Laboratory
Application of weed identification and weed control practices, considering various types of crops (including ornamentals), cultural control, herbicide equipment, application, and safety. Environmental considerations. Field trips. Special fee. Pre- or coreq: PBIO 706. 2 cr.

#709. Plant Stress Physiology
Physiological and biochemical mechanisms of plant responses to abiotic stresses including drought, salt, high and low temperature, visible and ultraviolet radiation, heavy metals, and air pollutants. Current hypotheses, agricultural and ecological implications are discussed. Prereq: plant physiology; biochemistry;/or permission. 3 cr.

#711. Plant Cell Biochemistry
Photosynthetic and nonphotosynthetic metabolism of plant cells: nitrogen and carbon metabolism, lipid biosynthesis and degradation, nitrogen fixation, respiration, integration and regulation of cell functions. Prereq: PBIO 501 or equivalent; PBIO 701;/or permission. 3 cr.

713. Photosynthesis
Physiology and biochemistry of photosynthesis in higher plants and microorganisms: light reactions, electron transport, membrane structure and function, carbon assimilation pathways, energy conservation, and metabolic regulation. Agronomic and ecological aspects of photosynthesis are examined. Prereq: plant physiology or biochem. 4 cr. (Not offered every year.)

714. Electron Microscopy
Theory and principles involved in preparing plant and animal tissue for observation with the transmission (TEM) and scanning (SEM) electron microscopes; shadow casting; photographic techniques; stereology; and presentation of micrographs for publication. Prereq: permission. Coreq: PBIO 715. 2 cr.

715. Electron Microscopy Lab
Practical application of theoretical principles and practices used in preparing and observing plant and animal tissues with the transmission and electron microscopes. Student project assigned. Prereq: permission. Coreq: PBIO 714. Special fee. 3 cr.

717. General Limnology
Special relationships of freshwater organisms to the chemical, physical, and biological aspects of the aquatic environment. Factors regulating the distribution of organisms and primary and secondary productivity of lake habitats. Prereq: BIOL 541 or equivalent. (Also offered as ZOOL 717.) 4 cr.

#718. Quantitative Aquatic Ecology
Aquatic ecosystems studied through field and laboratory exercises. Emphasis on the application of statistical methods from sampling design to statistical and ecological interpretation of results. Field trip data analyzed in both biology and statistics laboratories. Understanding how the principles underlying statistical concepts can be applied to biological systems will be emphasized. Fields trips, designed to collect data for rigorous statistical analysis, include remote pristine lakes in the White Mountains National Forest as well as lakes in southern New Hampshire. Prereq: BIOL 541 or equivalent. (Also offered as ZOOL 718.) 6 cr. (Fall semester only. Alternate years.)

719. Field Limnology
Ecology of inland waters examined through field studies of lakes, streams, and other freshwater habitats. Emphasizes methods for studying lakes, analysis and interpretation of data, and writing of scientific reports. Includes seminars on research papers and field trips to a variety of lakes from coastal plain to White Mountains. Prereq: concurrent or prior enrollment in PBIO 717, ZOOL 717, or equivalent and permission. Writing intensive. (Also offered as ZOOL 719.) Special fee. 4 cr.

721. The Microscopic Algae
Survey of phytoplankton and periphyton in local marine and freshwater habitats. Identification, systematics, and evolution. Class and individual collection trips. Prereq: BIOL 412 or PBIO 412 or 703. Lab. 4 cr. (Not offered every year.)

#722. Marine Phycology
Identification, classification, ecology, and life histories of the major groups of marine algae, particularly the benthonic marine algae of New England. Periodic field trips. Prereq: BIOL 412 or PBIO 412 or 703. Lab. 4 cr. (Not offered every year.)

724. Freshwater Algal Ecology
Survey of freshwater algal habitats; physiological explanation of population models. Individual experimental projects. Prereq: PBIO 717 or permission. 4 cr. (Not offered every year.)

725. Marine Ecology
Marine environment and its biota, emphasizing intertidal and estuarine habitats. Includes field, laboratory, and independent research project. Prereq: general ecology; permission. Marine invertebrate zoology, oceanography, and statistics are desirable. (Also offered as ZOOL 725.) 4 cr. (Not offered every year.)

726. Integrated Pest Management
Integration of pest management techniques involving biological, cultural, and chemical control with principles of ecology into management approaches for pests. Prereq: permission. Writing intensive. 4 cr.

727. Algal Physiology
Survey of major topics in the physiology and biochemistry of marine and freshwater algae including: nutrition, metabolic pathways, reproductive physiology, storage and extracellular products, cell inclusions, growth and development. Prereq: plant physiology or introductory biochemistry or permission. 3 cr. (Not offered every year.)

729. Algal Physiology Laboratory
Useful laboratory techniques in studying the physiology of freshwater and marine algae. Experiments in nutrition, metabolism, pigment, and enzyme analysis. Small research project required. Prereq: concurrent registration in PBIO 727; permission. 2 cr. (Not offered every year.)

730. Plant Growth Research and Modeling
Case-study approach is taken to learn the theory, practice and application of computer modeling of plant growth. The process of applied research covered, including problem definition, experimental design, data collection, analysis, report writing, and presentation. Prereq: BIOL 528 or permission. Special fee. Lab. 4 cr. (Not offered every year.)

#742. Physiological Ecology
Physiological responses of plants to the physical environment; energy exchange, light and photosynthesis, water relations, and mineral nutrition. Prereq: PBIO 701 or permission. Lab. 4 cr. (Not offered every year.)

744. Vegetation Sampling and Analysis
Methods for sampling plant populations and communities, especially estimation of abundance. Analysis of pattern, measurement of species diversity, and relation of abundance to environmental factors. Ordination and classification of communities. Modeling of succession. Prereq: statistics; BIOL 541 or equivalent. Lab. 4 cr.

745. Community Ecology
Methods for analysis of biological communities; ordination and classification of communities; theoretical and empirical investigation of factors controlling community structure; theory and modeling of succession. Occasional Saturday field trips. Prereq: intro. statistics and intro. ecology (BIOL 541, or equivalent). Lab. 4 cr. (Not offered every year.)

747. Aquatic Higher Plants
Flowering plants and fern relatives found in and about bodies of water in the northeastern United

States; extensive field and herbarium work, preparation techniques, and collections. Prereq: PBIO 566 or permission. Lab. 4 cr. (Not offered every year.)

751. Cell Culture
Theory and principles fundamental to the culture of cells in vitro. Introduction to techniques of preparation and maintenance of animal, plant, insect, and fish cell cultures. Application of cell culture to contemporary research in biological sciences. Prereq: MICR 503; permission. (Also offered as ANSC 751 and MICR 751.) Special fee. Lab. 5 cr.

752. Mycology
Classification, identification, culturing, life histories, and ecology of fungi, from slime molds to hallucinogenic mushrooms; the significance of fungi in human history, from their contribution to the art of bread making and alcoholic fermentation to their destructiveness as agents of deadly diseases of plants and animals. Prereq: BIOL 411-412 or PBIO 412 or equivalent. Special fee. Lab. 4 cr.

753. Cytogenetics
Chromosome structure, function, and evolution. Eukaryotic genome organization. Theory of, and laboratory techniques for, cytogenetic analysis in plants and animals. Prereq: prin. of genetics. Special fee. Lab. (Also offered as GEN 753.) 4 cr. (Not offered every year.)

754. Laboratory in Biochemistry and Molecular Biology of Nucleic Acids
Application of modern techniques to the analysis of biomolecules, with an emphasis on nucleic acids; includes DNA isolation and analysis, cloning, sequencing, and analysis of gene products. No credit if credit has been received for MICR 704. Prereq: BCHM 658/659; 751;/or permission. (Also offered as BCHM 754 and GEN 754.) Special fee. Lab. 5 cr.

758. Plant Anatomy
Anatomy of vascular plants, emphasizing structure and development of basic cell and tissue types, and of the major plant organs. Prereq: BIOL 412 or PBIO 412. Lab. 5 cr. (Not offered every year.)

761. Plant Geography
Distribution of plants, a consideration of world vegetation types and floras, and problems of endemism with emphasis on North America; major influential factors such as geologic, climatic, edaphic, and biotic. Four Saturday field trips. Prereq: PBIO 566 or permission. 4 cr. (Not offered every year.)

765. Molecular Biology and Biochemistry of Plants
Molecular mechanisms and regulation of plant metabolic function. Structure and function of cellular constituents of plants; role of secondary metabolites. Emphasis on developments in the current literature. Complements PBIO 774/775. Prereq: BCHM 658 or 751; BIOL 604; or permission. (Also offered as BCHM 765.) 3 cr.

#773. Breeding Improved Varieties
Techniques for creating new varieties of crop and ornamental plants. Prereq: genetics. 4 cr. (Not offered every year.)

774. Plant Cell Culture and Genetic Engineering
Theory and techniques of cell/tissue culture and genetic manipulation in plants, transformation vectors, somatic cell genetics, regulation of foreign gene expression, molecular basis of agriculturally important traits, environmental and social implications of genetic engineering in plants. Prereq: BIOL 604 or permission. 3 cr. (Not offered every year.)

775. Plant Cell Culture and Genetic Engineering Lab
Techniques of plant cell and tissue culture, protoplast fusion, genetic transformation, and mutant cell selection, analysis of foreign gene expression. Coreq: PBIO 774. (Also offered as GEN 775.) Special fee. 2 cr.

795. Investigations in Plant Biology
Topics may include systematic botany, plant physiology, plant pathology, plant anatomy, plant ecology, mycology, cell biology, phycology, botanical teaching, morphology, cell physiology, scientific writing, microtechnique, cell and tissue culture, history of botany, genetics, plant utilization, or teaching experience. Individual projects under faculty guidance. Prereq: permission. 4 cr. max. per semester for any single section. May be repeated. 1–6 cr.

797. Senior Seminar
Library research, presentation, and discussion of current topics in plant biology. Attendance of selected seminars in related subject areas. Required of all senior majors in environmental horticulture. 1 cr. Cr/F. (Fall semester only.)

799. Honors: Senior Thesis
Students work under the direction of a faculty sponsor to plan and carry out independent research resulting in a written thesis. Two-semester sequence; IA grade (continuous course) given at end of first semester. May be repeated to a total of 6 credits. 2–4 cr.

Political Science (POLT)

(For program description, see page 44.)

Chairperson: B. Thomas Trout
Professors: Marilyn Hoskin, B. Thomas Trout
Associate Professors: Warren R. Brown, John R. Kayser, Aline M. Kuntz, Susan J. Siggelakis, Clifford J. Wirth
Assistant Professors: Marla A. Brettschneider, John F. Camobreco, Janine Clark, Clark R. Hubbard, Daniel R. Krislov, Lawrence C. Reardon, Stacy D. VanDeveer

Introductory Courses

401. Politics and Society
Introduction to the nature of politics and political institutions. Emphasis on political behavior and continuing issues of modern politics, such as power, authority, legitimacy, freedom, and order. 4 cr.

402. Power and Politics in America
Power and competition in American politics focusing on: voters and elections; public opinion and the media; interest groups and political institutions—the President, Congress, and the Courts. Examines critical political issues from the founding of the nation to the present. 4 cr.

403. United States in World Affairs
Introduction to United States foreign policy since the end of World War II examining the foundations of American policy, the origins and conduct of the Cold War and the dilemmas of the post Cold War era. Explores contemporary problems facing United States foreign policy such as national and international security, ethnic strife, the international economy and transnational global issues. 4 cr.

407. Law and Society
Introduction to the ways in which law operates in modern society: its forms, functions, underlying values, and the consequences of its application in particular regimes. Topics include the psychological bases for legal obligation; the evolution of particular legal doctrines; the philosophical underpinnings of legal responsibility; the relationship of law to social structures; the relationship of law to morality; the nature of legal reasoning; and critiques of law. 4 cr.

595, 596. Explorations in Politics
Designed to meet special interests of students and instructors in exploring selected issues in political science. See departmental listings for semester offerings. Writing intensive. 2–4 cr.

American Politics

500. American Public Policy
Political and economic factors that mold the processes by which American policy makers deal with such domestic issues as crime and violence, poverty and inequality, inflation and unemployment, urban blight and renewal, and energy and the environment. Writing intensive. 4 cr.

502. State and Local Government
Powers, politics, political cultures, and constitutional settings of American state and local governments. State legislatures, governorships, court systems, political parties, electoral systems, and interest groups. Structures and functions of local governments, including towns, cities, counties and special districts. Writing intensive. 4 cr.

504. American Presidency
The President as administrator, policy maker, and political leader. The relationship between the President and the public, the media, and other governmental institutions. Historical and constitutional background of the Presidency. Role and powers of the President in domestic and foreign affairs. 4 cr.

505. American Congress
Role and powers of Congress as national lawmaker and check on the executive branch: committee structure, concepts of representation, legislative oversight and party cleavage, federal budget control, and foreign policy involvement. 4 cr.

#506. Parties, Interest Groups, and Voters
Role of political parties as organizers and managers of social conflict. Role of voters in controlling parties and government. Influence of interest groups in the electoral process and in governmental decision making. 4 cr.

507. Politics of Crime and Justice
Criminal justice in theory and practice; contemporary role of police, prosecutors, judges, juries, counsel, and interest groups in the administration of criminal justice. Writing intensive. 4 cr.

508. Supreme Court and the Constitution
Supreme court treated as a political institution whose historic mission is to decide all controversies arising under the constitution between the nation

and the states, the President and Congress, governments generally and the people regarding their respective rights and duties. 4 cr.

#509. Bureaucracy in America
Growth and development of the bureaucratic state. Roles and powers of administrative officials, decision making in bureaucratic settings, citizen participation, and the influence of interest groups on bureaucratic policy making. 4 cr.

510. Mass Media in American Politics
Contemporary review of media in politics; major roles of media today in providing news, setting public agenda, influencing public opinion; government regulations vs. media responsibility; future developments and consequences for American democracy. Writing intensive. 4 cr.

512. Public Opinion in American Politics
Relationship of mass and elite opinion within the context of American political culture. Impact of public opinion on American governmental policies, especially with respect to major issues facing the President and Congress. Appraisal of responsiveness to influence and responsibility to lead. Writing intensive. 4 cr.

513. Civil Rights and Liberties
Analysis of three major areas of constitutional rights and liberties—political freedom, equal protection of the laws, and due process—with particular attention to their impact on such problems as political protest, discrimination, school segregation and busing, and student rights. Writing intensive. 4 cr.

600. Selected Topics in American Politics
Special topics such as politics and public affairs in New Hampshire, women in politics, and civil liberties. See department listings for semester offerings. Writing intensive. 4 cr.

701. The Courts and Public Policy
Impact of judicial decisions on public policy at federal, state, local, and regional levels. Writing intensive. 4 cr.

702. Public Planning and Budgeting
Analysis, goal setting, and strategic planning in a governmental setting, with particular emphasis on budgetary processes as a means for controlling policy effectiveness. Writing intensive. 4 cr.

703. Urban and Metropolitan Politics
An eclectic approach to the study of urban and metropolitan politics. Topics include: urban politics, forms of local government; migrations, urban development, intergovernmental relations; community power structure, urban policy making, urban service delivery, crime and law enforcement, urban bureaucracy, urban decay, and revitalization. Writing intensive. 4 cr.

704. Policy and Program Evaluation
Policy and program evaluation of federal, state, and local governmental enterprise; focuses on the politics, practices, and methods of evaluative investigation. Evaluation as a technique for providing rational information for budgetary and policy-making decisions. Writing intensive. 4 cr.

797, 798. Section B: Seminar in American Politics
Advanced analysis and individual research. Prereq: senior standing. Writing intensive. 4 cr.

797, 798. Section F: Seminar in Public Administration
Advanced analysis and individual research, including opportunities for direct observation of governmental administration. Prereq: senior standing. Writing intensive. 4 cr.

Political Thought

520. Justice and the Political Community
Origin of the idea of justice; relationship between politics, justice, and morality; selections from Plato, Aristotle, Roman, Islamic, and Christian political philosophers. 4 cr.

521. Rights and the Political Community
Human rights and the quality of communities as expressed in Hobbes, Locke, Mandeville, Rousseau, and others. 4 cr.

522. Dissent and the Political Community
Current political ideologies and controversies in America and abroad; liberal democracy and its critics since the 19th century. 4 cr.

#523. American Political Thought
American political thinkers and observers of American politics; the founding of the Republic; problems and tensions reflected in the writings of Calhoun, Thoreau, Lincoln, de Tocqueville, and others; relations between liberty and authority, democracy and stability, capitalism and alienation. Writing intensive. 4 cr.

524. Politics and Literature
Classical and contemporary works of literature to illustrate perennial issues in political philosophy; among authors studied are Aristophanes, Sophocles, Shakespeare, Melville, Tolstoy, and Sartre. 4 cr.

525. Multicultural Theory
Issues of concern generated from an attention to and appreciation of our diverse cultural identities. As a theory course in political framework, we approach multiculturalsim as a new attempt to respond to the challenges that difference poses in democratic theory. 4 cr.

620. Selected Topics in Political Thought
Selected issues in political theory, such as liberalism and conservatism, radical political thought, the American political character, and others. See department listings for semester offerings. Writing intensive. 4 cr.

#720. Perspectives on Political Science
Different views on the study and meaning of politics. Perspectives of political scientists, political philosophers, and political activists. 4 cr.

721. Feminist Political Theory
Exploration of various strands of feminist political theory; taking a specifically political view of the challenges of feminist activism and philosophy. We address issues of the public space, power, social transformation, and democracy. 4 cr.

797, 798. Section I: Seminar in Political Thought
Advanced treatment and individual research. Prereq: senior or graduate standing. Writing intensive. 4 cr.

Comparative Politics

544. Dictatorship and Totalitarianism
Political systems of Nazi Germany, Fascist Italy, Stalinist Russia, and Maoist China; the movements that gave rise to them and their significance for understanding political behavior. Writing intensive. 4 cr.

545. People and Politics in Asia
Surveys the contemporary politics of nations and peoples of East Asia within the framework of their modern histories and societies. Emphasizes China and Japan, and introduces the evolving political systems of Taiwan, North and South Korea, Hong Kong/Macao. Companion course to POLT 546, but either may be taken separately. Writing intensive. 4 cr.

#546. Wealth and Politics in Asia
Different paths to modernization, industrialization, and development in nations of the Asia-Pacific Rim. In-depth examination of the challenges faced by Japan, China, Hong Kong/Macao, Taiwan and the Koreas in their search for the correct path to economic growth and prosperity, with special emphasis on each nation's distinct society and history. Companion course to POLT 545, but either may be taken separately. Writing intensive. 4 cr.

547. Politics of the Middle East
An examination of the political dynamics of selected states and societies (Egypt, Syria, Iraq, Jordan, Saudi Arabia, Israel, and Palestine) in the Middle East. Issues examined include: different ways of understanding the politics of the Middle East, impact of early Middle Eastern history upon today's politics; classes in the Middle East and their impact upon politics; rise of Arab nationalism; Zionism; military intervention in politics; politics of oil; status of women; political impact of economic restructuring; Islamic movements; state-building; and political liberalization and democratization in the Middle East. Writing intensive. 4 cr.

550. Comparative Government and Society
Concepts for comparing modern political systems. Ideologies, political movements, and various forms of the modern state; different models of development and modernization. Examples from Western-style democracies, former communist systems, and the developing countries of the third world. Writing intensive. 4 cr.

551. Global Urban Politics
Examines the social, economic, demographic, and political processes of cities around the globe. Topics include: population growth; theories of urbanization; urban economic development; urban policies toward transportation; environment; employment; housing; land; water supplies; sanitation; solid-waste disposal; and infrastructure. Comparisons are made between cities of the developed and less developed nations of the world. Urban and national social stratification, structures of urban and subnational governments, and political participation examined. Writing intensive. 4 cr.

552. Contemporary European Politics
Politics and governments in Western Europe, with attention to both basic characteristics of political life in different countries and current issues of politics. Writing intensive. 4 cr.

#553. Third World Politics
Third world politics in selected states of Africa, Latin America, and elsewhere. Issues and concepts of political change and development. 4 cr.

#554. Politics of Central America, Mexico, and the Caribbean
Politics and development in Central America, Mexico, and the Caribbean; political conflict in Central America, Cuba's revolutionary experience, and Mexico's lingering authoritarian politics. Writing intensive. 4 cr.

555. Politics in Russia
Examines the politics and society in contemporary Russia: underlying values and culture; problems of political and economic development; and the structure and dynamics of the current system. Special attention to problems associated with leadership, political legitimacy, the economy and nationalism. 4 cr.

556. Politics in China
Dynamics of China's domestic political and economic policy processes-from massive starvation of the Great Leap Forward and the ideological upheavals of the Great Proletarian Cultural Revolution to the "Opening of China to the Outside World." Writing intensive. 4 cr.

557. Politics in Japan and Southeast Asia
Major noncommunist governments in East Asia; parties and policy making in Japan and other states such as Malaysia, Thailand, Indonesia, and the Philippines. Writing intensive. 4 cr.

#558. Government and Politics of Canada
Cultural background of party competition, role of ideology, structure of government, and contemporary issues in Canadian political system. Special fee. Writing intensive. 4 cr.

#559. The Politics of South America
Politics and development of South American nations and the experiences of populism, reform, insurgency, military authoritarian rule, and the breakdown of democratic norms along with the current process of political liberalization in the region. 4 cr.

651. Selected Topics in Comparative Politics
Specialized areas or issues such as regional politics, national politics, judicial systems, administrative law, constitutions, etc. See department listing for semester offerings. Writing intensive. 4 cr.

743. Comparative Political Economy
Exploration of the origins, development, and functions of the modern state in the West, its links with markets and capitalism, and its role in contemporary political economy. Examples from various advanced industrial societies. Writing intensive. 4 cr.

744. Wealth, Poverty and Politics in the Middle East
An examination of the role of the West in the development of the economies of agriculture, oil, manufacturing and information technology in the Middle East, and of the political responses of Middle Eastern states to gain control over their economies and address the needs of their populations. Writing intensive. 4 cr.

747. Women and Politics in the Middle East
Examination of women as agents of social and political change in the Middle East. Focus on the diversity of rural, urban, secular and religious women's groups, their differing goals and activities, reasons for their successes and failures. Writing intensive. 4 cr.

797, 798. Section C: Seminar in Comparative Politics
Advanced analysis focusing on government and politics in foreign nations or regions. Areas of interest may include: constitutional structures, political parties and interest groups, legislatures, bureaucracy and public policy. Topics address such concerns as: religion and politics, patterns of economic development, ethnic strife, political leadership. Prereq: senior standing. Writing intensive. 4 cr.

International Politics

560. World Politics
Examines the structures, processes and issues that shape contemporary international relations. Topics included are: the rise of the nation-state system and its current prospects; national and international security in the post Cold War era; problems of the international political economy; international conflict resolution; human rights; and global environmental politics. 4 cr.

562. Strategy and National Security Policy
Introduction to the problems of national and international security concentrating on the development of United States security policy. Topics include: the general framework of national security, the evolution of strategy, strategic thought during the Cold War, the structure and processes of defense policy making in the United States and contemporary security issues in the post Cold War world-regional conflict, proliferation of weapons of mass destruction, international terrorism and alternative approaches to security. Writing intensive. 4 cr.

564. Russia in World Affairs
Background and contemporary perspectives on the Russian role in international politics. Particular emphasis on issues in international economics, American relations, security developments, and regional relations. 4 cr.

#565. United States-Latin American Relations
Contemporary political, economic, and social relations between the U.S. and Latin America. Topics include the pattern of U.S. response to political change in Latin America, regional cooperation, debt, trade investment, the drug trade, immigration, rising interdependence, and prospects for economic integration. 4 cr.

566. Foreign Policies of Asia and the Pacific
Analyzes the foreign policies and interactions of the four great Pacific powers: China, Japan, the Soviet Union and the United States from the breakdown of the western imperialist order and the rise of Imperial Japan, the Cold War clashes in Korea and the Sino-Soviet Border, to the current search for a new Pacific economic and political order. Writing intensive. 4 cr.

567. Politics of Global Resources
International politics from the perspective of the exhaustability of global resources and the expansion of global demand. Concentrates on issues including population, food, energy, the environment, security, and human rights. Global interdependence and the appearance of new institutional frameworks of global public policy making. Writing intensive. 4 cr.

568. Introduction to Intelligence
The purpose and practice of intelligence in the national security process. Concentration on the role of intelligence in the United States involving the C.I.A., military intelligence agencies, and the practice of intelligence in other countries. Writing intensive. 4 cr.

569. Chinese Foreign Policy
Analysis of China's struggle for power in Asia and the World. Examines the legacy of China's historical encounters with the outside world, her interactions with the international system since 1949, domestic determinants of foreign policy and theories of decision making. Writing intensive. 4 cr.

571. International Politics of the Middle East
An examination of inter-Arab affairs and United States involvement in the region. Particular focus on: oil and economics; migration; transnational political ideologies (Arab nationalism, Islam, democracy); and the Arab-Israeli crisis. Writing intensive. 4 cr.

660. Selected Topics in International Politics
Examines specialized issues in international politics. Topics may include such areas as: ethnic conflict; non-proliferation and global security; economic and political globalization; etc. See department listings for semester offerings. Writing intensive. 4 cr.

760. Theories of International Relations
Theoretical approaches of international politics, international organization and international political economy with particular emphasis on systems theories, domestic determinants of foreign policy and theories of decision making. Writing intensive. 4 cr.

#761. International Law
Formalized processes for regularizing state behavior; development of norms based on custom, precedent, and formal institutions, as in treaties and cases. Arms reduction and limitation arrangements; inspection, and other formal procedures designed to preserve peace. Writing intensive. 4 cr.

762. International Political Economy
The evolution of international economic regimes (monetary, trade, development). Particular emphasis on theoretical approaches to explain current economic problems: systemic theories (interdependence, hegemonic stability); domestic determinants (bureaucratic, interest group); and decision-making theories (rational choice). Writing intensive. 4 cr.

#778. International Organization
Various forms of cooperation among nations on security, economic, environmental and social issues through international organizations such as the United Nations, NATO, the World Trade Organization and other global and regional bodies. Includes examination of the role and influence of non-governmental international organizations. Writing intensive. 4 cr.

797, 798. Section E: Seminar in International Politics
Advanced analysis focusing on problems of theory and contemporary issues in international politics. Areas of interest may include: democratic norms in international relations; NATO expansion and European security; the peace process in the Middle East; etc. See department lisings for semester offerings. Prereq: senior standing. Writing intensive. 4 cr.

Internships, Advanced Studies, and Honors Thesis

602A, B. Internship in Political Science
Field experience in a governmental or nongovernmental organization at the local, state, national, or international level. Arrangements should be made through the political science department. Open to juniors or seniors with at least a 3.20 G.P.A. Permission of the Undergraduate Curriculum Committee of the department is required prior to the internship. From 4 to 16 credits may be taken; however, only 4 credits may be for a grade. The rest will be credit/fail, and only 4 credits may be applied to the political science major. May be taken in conjunction with Advanced Study in Political Science. (602A: Variable 4–12 cr. Cr/F; 602B: 4 cr. Letter grade.)

602C. Concord Internship Program
Provides students with field experience in state government in Concord (working for a state senator, legislative lobbyist or the Governor's Office). Students will spend Tuesday through Thursday in Concord and attend a weekly practicum in Durham. Open to junior and senior majors with a 3.2 or better GPA. Applications accepted in the fall semester. Permission required. Prereq: POLT 402 and 502. Students will enroll in POLT 602A for 4 credits, Cr/F and 602C for 4 credits letter grade.

795, 796. Advanced Study in Political Science
Senior POLT majors, with a cumulative average of 3.20 or greater, may undertake advanced study (political science), in an area of their choice, in consultation with member(s) of the faculty. Normally, the result of the project will be a significant written product of a quality comparable to that done at the 700 course level. Students must initiate the project discussion and obtain approval of the Undergraduate Curriculum Committee of the department before undertaking the project. Writing intensive. 4 cr.

799. Honors Thesis
Senior POLT honors-in-major students (see department for honors-in-major requirements), with a cumulative average of 3.20 or greater, may undertake a special honors project in an area of their choice. The results of this special project will be a significant written product constituting an honors thesis, under the supervision of a faculty sponsor. Students must initiate the project discussion and obtain the approval of the Undergraduate Curriculum Committee before undertaking the project. The honors thesis will constitute the tenth course in the major. Writing intensive. 4 cr.

Portuguese (PORT)

Department of Languages, Literatures, and Cultures
(See department note, page 31; faculty listing, page 212.)

401–402. Elementary Portuguese
For students without previous knowledge of Portuguese. Aural-oral practice; fundamental speech patterns; reading and writing to achieve a firm basis for an active command of the language. Labs. No credit toward a major. (No credit for students who have had two or more years of Portuguese in secondary school; however, any such students whose studies of Portuguese have been interrupted for a significant period of time should consult the chairperson about possibly receiving credit.) Special fee. 4 cr.

500. Selected Topics in World Literature
Topics will be chosen which introduce students to major themes and genres. (Also offered as CLAS 500, FREN 500, GERM 500, ITAL 500, RUSS 500, SPAN 500, WLCE 500.) May be repeated for credit. Writing intensive. 4 cr. Cr/F.

503–504. Intermediate Portuguese
Conversation and composition based on readings in contemporary Portuguese and Brazilian literature, especially theatre, which is closest to conventional language. A traditional grammar text supplements reading. Special fee. Lab. 4 cr.

Psychology (PSYC)

(For program description, see page 45.)

Chairperson: Kenneth Fuld
Professors: Victor A. Benassi, Ellen S. Cohn, Peter S. Fernald, Kenneth Fuld, Robert G. Mair, Kathleen McCartney, Edward J. O'Brien, Rebecca M. Warner, William R. Woodward
Associate Professors: Robert C. Drugan, John E. Limber, John D. Mayer, Carolyn J. Mebert, William Wren Stine, Elizabeth A.L. Stine-Morrow, Daniel C. Williams
Research Associate Professor: Daniel G. Morrow
Assistant Professors: Victoria L. Banyard, Deborah J. Coon, Suzanne Mitchell
Academic Counselor: Janice Chadwick

The listings that follow are general descriptions of the courses. Students are referred to the Instructors' Course Descriptions published by the department each semester for specific details about each section. Listings will be made available in departmental offices during the preregistration period.

PSYC 401 is a prerequisite for all courses in the psychology department except PSYC 402 and 571.

PSYC 402 and 502 are prerequisites for all 700-level psychology courses.

General Course

401. Introduction to Psychology
Psychology as a behavioral science; its theoretical and applied aspects. Coverage of basic topics in the field, including developmental, learning, personality, abnormal, social, perceptual/sensory, and physiological psychology. To experience actively the nature of psychological research, students have an opportunity to participate in a variety of studies as part of a laboratory experience. 4 cr.

Major Courses

402. Statistics in Psychology
Design, statistical analysis, and decision making in psychological research. Substantive problems as illustrations of typical applications and underlying logic. No credit for students who have completed ADM 430; BIOL 528; DS 420; EREC 525; HHS 540; MATH 644; SOC 502. Special fee. 4 cr.

502. Research Methods in Psychology
Research design, including experimental and correlation design; internal versus external validity; measurement; writing a research report; graphic and statistical methods for summarizing data; sampling; and special problems such as experimenter effects, reactivity of measurement, and others. The use of hypothesis testing and data analysis in research. Prereq: PSYC 401 and 402. Special fee. Writing intensive. 4 cr.

512. Psychology of Primates
A comparative analysis of primate cognitive, linguistic, and social processes. The origins of human behavior will be explored from the perspectives of history, evolution, and contemporary work in neuropsychology, linguistics, sociobiology, and related fields. Prereq: PSYC 401. 4 cr.

513. Cognitive Psychology
The study of human cognition, its basic concepts, methods, and major findings. Human knowledge acquisition and use. Attention; perception; memory; imagery; language; reading; problem solving; and decision making. Prereq: PSYC 401. 4 cr.

521. Behavior Analysis and Its Applications
Principles developed from experimental study of human and animal learning; their theoretical integration; their application to the understanding of human behavior. Procedures for changing behavior in practical situations, related to theories of learning. Prereq: PSYC 401. 4 cr.

522. Behaviorism
Introduction to behaviorism as a philosophy of science. Some historical background, but concentration on modern behaviorism as exemplified in the works of B. F. Skinner. Prereq: PSYC 401. 4 cr.

531. Psychobiology
Introduction to the behavioral neurosciences. Surveys research conducted by psychologists to learn about the biological basis of behavior: development, sensation, perception, movement, sleep, feeding, drinking, hormones, reproduction, stress, emotions, emotional disorders, learning, and memory. Prereq: PSYC 401. 4 cr.

552. Social Psychology
Behavior of individuals as affected by other individuals, groups, and society. Topics include attitude change and social influence, conformity, social interaction, interpersonal attraction, impression formation, research. Prereq: PSYC 401. 4 cr.

553. Personality
Major theories, methods of assessment, and research. Prereq: PSYC 401. 4 cr.

561. Abnormal Behavior
Causes, diagnosis, and treatment of abnormal behavior. Implications of varying theoretical viewpoints. Prereq: PSYC 401. 4 cr.

571. The Great Psychologists
Historical introduction to some of the great psychologists and their classic works. 4 cr.

581. Child Development
The developing child in the context of his/her society. Current problems in, and influences on, development of the child. Personality and cognitive development; exceptional children. Prereq: PSYC 401. 4 cr.

582. Adult Development and Aging
A life-span developmental framework for the study of growth, decline, and stability on adult development. Developmental methods in adult development research; biological basis for aging; patterns of change and stability in diverse domains of psychological functioning, e.g., perception, cognition, intellectual performance, and personality organization. Prereq: PSYC 401. 4 cr.

702. Advanced Statistics and Research Methodology
Experimental design, analysis, and interpretation. Repeated measures, designs, trend analyses, nonparametric analyses, confounding, missing data, interpretation of interactions, and computer processing of data. Intended primarily for majors planning to attend graduate school. Prereq: PSYC 402; 502;/or permission. 4 cr. (Not offered every year.)

#704. Research Methods in Social Psychology
Critical examination of the experimental method and nonexperimental alternatives, including survey research, field techniques, and evaluation research. The importance of ethical responsibility, experimental artifacts, and validity issues. Each student is responsible for an original research project. Prereq: PSYC 402; 502;/or permission. Special fee. Writing intensive. 4 cr.

705. Tests and Measurement
Testing intelligence, creativity, achievement, interests, and personality. Test construction; evaluation; relation to psychological theory, research, and practice. Prereq: PSYC 402; 502;/or permission. 4 cr.

710. Visual Perception
Anatomy, physiology, psychophysics, and perceptual processes of vision. Topics include physics of light, psychophysics, color, space and form, depth, motion, eye movements, visual learning and development, constancy, and illusions. Prereq: PSYC 402; 502; 531;/or permission. Special fee. Writing intensive. 4 cr.

711. Sensation and Perception
Anatomy, physiology, psychophysics, and perceptual processes of the visual, auditory, gustatory, olfactory, and cutaneous senses. Topics include stimulus definition, psychophysics, sensory transduction, sensory and perceptual adaptation, neural coding of space, time, magnitude, and quality. Prereq: PSYC 402; 502; 531;/or permission. Special fee. Writing intensive. 4 cr.

712. Psychology of Language
Theories of language structure; functions of human language; meaning; relationship of language to other mental processes; language acquisition; indices of language development; speech perception; reading. Prereq: PSYC 402; 502; 512 or 513;/or permission. Special fee. Writing intensive. 4 cr.

713. Advanced Cognitive Psychology
Complex mental activities; consciousness and attention; concept formation; reasoning; problem solving; creative thinking; relationship between cognition and affective behavior. Prereq: PSYC 402; 502; 513;/or permission. Writing intensive. 4 cr.

721. The Experimental Analysis of Behavior
Environmental and biological determiners of behavior. Theory, research methods, and applications. Major concepts and recent research. Prereq: PSYC 402; 502; 521, or 522;/or permission. Special fee. Writing intensive. 4 cr.

731. Brain and Behavior
Neuropsychology, the study of brain/behavior relationships including clinical topics related to the analysis of neurological diseases in humans and more basic experimental topics related to integrative functions of the brain. The main focus is on cerebral cortex and functions related to perception, movement, attention, memory, and language. Prereq: PSYC 402; 502; 531;/or permission. Special fee. Writing intensive. 4 cr.

732. Evolution, Behavior, and Culture
Behavior from the perspective of evolutionary theory. Comparisons of basic processes, such as learning and social behavior, across species. Current psychological theories of behavior discussed in the light of theories formulated by ethologists and ecologists. Prereq: PSYC 402; 502; 512, 521, or 522;/or permission. Special fee. Writing intensive. 4 cr.

733. Drugs and Behavior
An introduction to the principles of psychopharmacology and the effects of psychoactive substances on behavior. Topics will focus on the therapeutic and recreational use of drugs and the mechanisms of drug action, that is how the drugs affect the brain. Neuropsychiatric function and dysfunction will be discussed as they relate to the use or abuse of particular drugs. Prereq: PSYC 402; 502; 531;/or permission. Writing intensive. 4 cr.

735. Neurobiology of Mood Disorders
Neurobiological and neurochemical substrates underlying various psychopathologies, using both animal models and human data. Study of disorders from the field of biological psychiatry including: aggression, anxiety, panic disorder, obsessive-compulsive disorder, unipolar depression, bipolar affective disorder, schizophrenia, and post-traumatic stress disorder. The effectiveness of current behavioral and pharmacological therapy. Prereq: 402; 502; 531;/or permission. 4 cr.

737. Behavioral Medicine
Behavioral, physiological, and neurochemical alterations associated with health-promoting behaviors (low-fat diet, exercise) as well as health-impairing behaviors (eating disorders, smoking, excessive alcohol consumption). Topics include stress, coping, type A behavior, hypertension, and the interface of brain, behavior, and immunity (psychoimmunology, cancer, AIDS). Treatment/therapy will be discussed from behavioral and pharmacological perspectives. Prereq: 402; 502; 531;/or permission. 4 cr.

752. Advanced Social Psychology
A general survey of current research and major theories. An in-depth critical analysis of selected topics such as attribution theory, social cognition, and theories of aggression. Prereq: PSYC 402; 502; 552;/or permission. Writing intensive. 4 cr.

755. Psychology and Law
Applications of psychology to the study of the law, including theories of legal and moral judgment, participants in the legal system (judges, police, victims, witnesses), the trial process, and plea bargaining. Special focus on the death penalty, the insanity plea, and child witnesses. Prereq: PSYC 402; 502;/or permission. Writing intensive. 4 cr.

758. Health Psychology
Survey of current topics in health psychology, including: social stress and the etiology of disease; Type A and other personality factors related to health; modification of risk factors; the practitioner-patient relationship; chronic pain; and the emotional impact of life-threatening illness. Prereq: 402; 502;/or permission. 4 cr.

762. Counseling
Theories of counseling; ethical considerations; professional and paraprofessional activities in a variety of work settings. Prereq: PSYC 402; 502; 553, or 561;/or permission. Writing intensive. 4 cr.

770. History of Psychology
Survey of the history of psychology up to the 20th century. Major figures, theories, and developments. Relationship to developments in cultural history, philosophy, and the natural sciences. Beginnings of modern scientific psychology. Prereq: PSYC 402; 502;/or 571;/or permission. Writing intensive. 4 cr.

771. Psychology in 20th-Century Thought and Society
Reassesses, extends, and integrates knowledge of 20th-century psychology within the historical perspective. Major figures, schools, systems, theories. Social, institutional, and international developments since the 19th century. Review of major fields of psychology. Prereq: PSYC 402; 502;/or 571;/or permission. Writing intensive. 4 cr.

780. Prenatal Development and Infancy
Psychological development of infants from conception through second year of life. Factors and potential influences on reproductive health and prenatal physical and behavioral development. Transition to parenthood, infant temperament and parent-infant relationships. Developmental patterns of specific capabilities. Prereq: PSYC 402; 502; 581 or FS 525;/or permission. Writing intensive. 4 cr.

783. Cognitive Development
Theories of cognitive development. Comparison among major theorists on how knowledge, thought, and development are defined and studied. Current research, including cognitive development; memory; perceptual processes; language. Prereq: PSYC 402; 502; 581;/or permission. Writing intensive. 4 cr.

785. Social Development
Examines development of social interactions. Emphasizes important social relationships for the child (i.e., attachment to parents and friendships with peers). Considers other topics of relevance to social developmentalists, such as temperament, aggression, social cognition, and sex roles. Prereq: PSYC 402; 502; 581;/or permission. Writing intensive. 4 cr.

Special Courses

591. Special Topics in Psychology
New or specialized courses are presented under this listing. Staff present material not normally covered in regular course offerings. May repeat but not duplicate content. Prereq: PSYC 401. 4 cr.

595. Field Experience
Arranged by the student for fieldwork experience related to psychology. Work will be under supervision of placement site personnel. Psychology faculty sponsor academic credit for appropriate fieldwork activities combined with a relevant academic component. Requires signed learning agreement.

Prereq: PSYC 401; permission. May be repeated to a maximum of 4 cr. per semester and 8 cr. toward degree. Cr/F.

741. Advanced Topics
Advanced material in which instructor has specialized knowledge through research and study. May be repeated for different offerings. Topics under this listing may be used to fulfill a major requirement in category CI. A) Psychology as a Natural Science; B) Cognition; C) Behavior Analysis; D) Biological/Sensory. Prereq: PSYC 402; 502; plus other prerequisites when offered;/or permission. Writing intensive. 4 cr.

791. Advanced Topics
Advanced material in which instructor has specialized knowledge through research and study. May be repeated for different offerings. Topics under this listing may be used to fulfill a major requirement in category CII. A) Psychology as a Social Science; B) Social Psychology; C) Personality; F) Child Development; G) Adult Development. Prereq: PSYC 402; 502; plus other prerequisites when offered;/or permission. 791A and 791B are writing intensive. 4 cr.

793. Externship
Supervised practicum in one of several cooperating New Hampshire mental health/rehabilitation facilities. Coursework knowledge applied to meaningful work and team experience. Commitment includes a negotiated number of weekly work hours and weekly seminars. Supervision by institution personnel and the instructor. Course applications accepted beginning in March for fall term and October for spring term. Prereq: permission; PSYC major; PSYC 402; 502; 561; additional psychology courses desirable. 4–8 cr.

795. Independent Study
A) Physiological; B) Perception; C) History and Theory; D) Behavioral Analysis; E) Social; F) Cognition; G) Statistics and Methods; H) Experimental; I) Personality; J) Developmental; K) Counseling; L) Psychotherapy; M) Research Apprenticeship; N) Teaching of Psychology; O) Advanced Externship (content area to be determined). Arranged by the student with a psychology faculty sponsor. Learner/sponsor contract required. Minimum time commitment: three hours per credit per week. Enrollment by permission only. Prereq: PSYC 402; 502;/or permission. 1–4 cr.

797. Senior Honors Tutorial
For senior psychology honors students. Students propose honors theses under the supervision of psychology faculty. Theses proposed and begun in this course are completed in PSYC 799. Prereq: admission to psychology honors program. 4 cr. (Typically offered in fall.)

799. Senior Honors Thesis
Under supervision of psychology dept. faculty members, students complete the honors projects proposed and begun in PSYC 797. The honors project, which should be empirical in nature, culminates in an oral presentation at the end of the semester. Prereq: admission to psychology honors program; PSYC 797. Special fee. 4 cr. (Typically offered in spring.)

Recreation Management and Policy (RMP)

(For program description, see page 76.)

Chairperson: Lou G. Powell
Associate Professors: Ann L. Morgan, Lou G. Powell, Janet R. Sable
Assistant Professors: Linda Aldrich, Albert E. Williams
Adjunct Assistant Professors: James Hilton, Steven J. Miller
Instructor: Jill Gravink

#400. Impact of Leisure in Society
Critical factors such as self, family, aging, ecology, health, work patterns, communications, cultural diversity, affluence, and changing sex roles are studied in relationship to present and future leisure patterns. Leisure trends are examined through a process of issue analysis spanning social, technological, economic, and political spheres. 4 cr.

490. History and Philosophy of Leisure
Examines the historical and philosophical foundation of recreation and leisure. Emphasizes concepts, theories, and the interrelationships between factors (social, economic, political, and environmental), which influence people's leisure attitudes and behavior. Explores implications of leisure for holistic and balanced living. 4 cr.

501. Recreation Services for Individuals with Disabilities
Presentation and discussion of issues that concern the delivery of quality leisure services to individuals with disabilities in community settings. Lab requirements as well as classroom activities provide opportunities for practical experience. Prereq: permission. Lab. 4 cr.

502. Introduction to Therapeutic Recreation
History and professional concepts of therapeutic recreation and the roles and functions of the therapeutic recreation specialist. 4 cr.

550. Perspectives on Disability
Introduction to many fields of study to current perspectives on disability. Designed to appeal to students not intending to work with individuals with disabilities as a career focus. Students who will soon be in positions of managing key resources and systems associated with areas of community life targeted by the Americans with Disabilities Act (e.g., public transportation, state and local government, etc.) will gain a broader understanding of how to accommodate and value a diverse membership in their communities. 4 cr.

#554. Recreation Business Management
Principles of business management and managerial problem solving as applied to the operation of recreation facilities, parks, and tourist attractions. Emphasizes knowledge in both the public and private sectors: personnel and financial management, market analysis, promotion, and the protection and maintenance of facilities and resources. Prereq: RMP 490 or permission. Lab. 4 cr.

557. Recreation Services Program Design
Introduces the student to a systems approach to program design. Course topics include needs assessment techniques, goal setting and objectives writing, process of group planning, public relations, program evaluation, and leisure education. Applied projects are required. Prereq: RMP 490 or permission. Lab. 4 cr.

558. Program Supervision and Leadership
Emphasis on specific knowledge of leisure activity categories with related organization and leadership techniques. Other topics include facilitation of activity throughout the lifespan and planning for instruction, safety, and crisis confrontation. Applied projects are required. Prereq: RMP 557 or permission. Special fee. 4 cr.

560. Campus Recreation Services
Management of college unions and campus recreation resources in higher education. 4 cr.

#561. Introduction to Outdoor Recreation
The history, delivery system, social and economic impacts, and management tools for outdoor recreation. Includes identification of contemporary issues, problems, and opportunities in recreation resource management. Lab. 4 cr.

570. Community Systems Planning and Development
Evaluation of principal theories of community systems and planning. Topics include problem analysis, methods of community research design, and decision-making skills. 4 cr.

593. Special Topics
A) Camping and Outdoor Education for Individuals with Disabilities; B) State Parks: Their Management and Role; C) Therapeutic Recreation in the School Setting; D) Social Psychology of Leisure; E) Multicultural Perspectives in Recreation; F–Z) Interdisciplinary. Specialized courses covering information not presented in regular course offerings. Description of topics available in department office during preregistration. Prereq: RMP majors or permission. May be repeated but not in duplicate areas. 2–4 cr.

600. Multicultural Perspectives of Leisure
Explores the multicultural issues within a pluralistic society both generally and as they are specifically evident through leisure, recreation and play behaviors, values, and possibilities. Course topics and assignments applied to the exploration of three questions: (1) How does leisure expression honor, value, and preserve unique cultural and ethnic heritages? (2) Does and/or can leisure expression create meaningful bridges across interpersonal and societal differences? (3) What are the moral and ethical responsibilities and opportunities for leisure services providers within a pluralistic society? Writing intensive. 4 cr.

603. Principles of Therapeutic Recreation
Addresses the principles of activity analysis, client assessment, documentation, individualized program planning, selection of interventions, and collaboration with a treatment team. Prereq: RMP 490; 502. 4 cr.

604. Clinical Aspects and Techniques in Therapeutic Recreation
Addresses specific clinical knowledge and skills essential to therapeutic recreation service delivery including clinical interviewing, group process, leisure education, and treatment approaches, and intervention techniques. Prereq: RMP 490; 502; 603. 4 cr.

606. Therapeutic Recreation Practices and Procedures
Introduction to and utilization of mobility techniques in clinical settings. Application of activity and task analysis to selected leisure activities with a variety of populations. Creation of, and use of, assistive technology and adaptive recreation devices appropriate to specific disabilities. Knowledge and utilization of leadership and group process strategies. Prereq: RMP 490; 502; 603. Special fee. 2 cr.

654. Professional Development and Ethics
Focus on preparing students for the internship experience through the identification of career goals and the selection of an approved internship site. A portfolio emphasizing process skills in résumé construction, interviewing techniques, establishing internship goals and objectives, and self-assessment will be developed. Majors only. Prereq: permission. 2 cr. Cr/F. IA.

663. Management and Policy in Leisure Services
Comparative analysis of administrative processes within various organizations as well as the political and policy-making roles of managers in the private and public sectors. Emphasis on organizational development, fiscal management, and budgeting as tools used in formulating and implementing policy. Prereq: RMP 557 or permission. 4 cr.

664. Internship
A) Internship in Recreation Management; B) Internship in Therapeutic Recreation. Students enroll in the section corresponding to their major option after receiving approval from the academic adviser. Supervised work experience in an approved profession-related agency. An IA grade (yearlong course) may be assigned at the end of the semester or summer session. Prereq: majors only; permission. Special fee. 2–6 cr. Cr/F.

665. Information Retrieval and Communication in Leisure Services
Prepares students to respond effectively to an information-based society. Course topics are applied to the leisure service delivery systems and include microcomputer systems and applications; standardized information systems; networking; and dissemination of information through audio-visual, print, and mass media. Prereq: RMP 557 or permission. 4 cr.

#667. Recreation Resource Planning
Overview of site-planning techniques and issues as currently practiced by recreation resource agencies at local, state, and national levels. Relationships of planning to management, policy, and practice; current trends in planning and likely future directions. Extensive use of field trips to enable students to learn how to read landscapes in order to use natural features in design as well as to enhance visitor experiences. Prereq: RMP 490; RMP major or permission. 4 cr.

696. Recreation Management and Policy Practicum
Student majors who are juniors or seniors may receive academic credit for work experience connected to their professional goals in conjunction with academic objectives and assignments approved by the faculty member sponsoring the practicum. Students must complete and obtain the signature of a faculty sponsor for the practicum proposal prior to registration. May be repeated for a maximum of 4 cr. Prereq: junior or senior status; RMP majors; permission. 1–4 cr. Cr/F.

698. Meetings and Conventions
Provides an in-depth perspective on the planning, implementation, and evaluation of meetings and conventions in the corporate/commercial recreation environment. Students will be exposed to the following topical areas: (a) trends in meeting management, (b) goal and objective technology, (c) convention budgeting, (d) site selection and evaluation, (e) liability and legal aspects, and (f) food and beverage planning. Course consists of lecture, discussion, and site visits to corporate/commercial recreation venues. Prereq: junior standing. (Also offered as HMGT 698C.) 4 cr.

705. Management and Policy in Therapeutic Recreation
Addresses National Council for Therapeutic Recreation Certification knowledge areas concerning management competency. Students acquire knowledge of current principles and procedures for assuming an administrative role in the therapeutic recreation profession. Issues and practices related to budgeting, reimbursement, quality improvement programs, and comprehensive program planning. Prereq: RMP 502; 603; 604. 4 cr.

711. Recreation Resource Management
Examines the supply and demand of natural resources for outdoor recreation uses, with emphasis on relationships between public and private roles and responsibilities. Social, environmental, and economic impacts of outdoor recreation use are discussed. Current principles and techniques of recreation resource planning and management are outlined. Prereq: seniors or permission. 4 cr.

724. Grantsmanship, Evaluation, and Research
Emphasis on understanding and application of grantsmanship, research techniques, and research writing. Addresses the process of program planning and grant proposal development. Examines research methodologies and the evaluation processes as applied to recreation and allied health settings. Critical assessment of uses and limitations of research for recreation. Prereq: RMP 557, 558 and senior RMP major or permission. Writing intensive. 4 cr.

743. Environmental Education
Blend of environmental education/interpretation theory, process, and practical application. Includes seminars, workshops, and practical experience in an environmental education program. Prereq: permission. 4 cr.

#764. Issues in Leisure Services Management
Issues are presented and discussed as related to applied professional practice. Examination of the commonality in professional experience as well as in-depth investigation of option-specific issues and trends. Students enroll in the course section corresponding to their declared option within the major: A) Program Administration; B) Therapeutic Recreation. Prereq: RMP major; senior; permission. 4 cr.

772. Law and Public Policy in Leisure Services
Topics including the law of torts, contracts, property, civil rights, risk management, and legal research are addressed in the context of leisure services and recreation resources. Public policy and professional advocacy implications are examined in relation to legislative and judicial systems. Prereq: RMP 557, 558 and senior RMP major or permission. 4 cr.

793. Advanced Topics
A) Area and Site Planning; B) Concepts and Trends in Therapeutic Recreation; and C) Conference Planning. Topics presented by instructors with specialized knowledge gained through professional practice, research, and study. Description of topics available in department office during preregistration. May be repeated but not in duplicate areas. 2–4 cr.

796. Independent Study
Individual study and/or research relating to leisure-oriented topics. Prereq: permission. 1–4 cr.

Religious Studies (RS)

(For program description, see page 30.)

Coordinator: David Frankfurter

483. History of World Religions
Introduction to the religions of the world in terms of historical development, relationship to society, belief system, central texts, and ritual practices. Writing intensive. (Also offered as HIST 483.) 4 cr.

484. Patterns in World Religions
Introductory course on the comparison of religions and religious patterns. Examining cross-cultural themes such as sacred places, sacred books, and sainthood, students become acquainted with the concepts and methods used in the historical study of religions. Primary and secondary readings encompass a wide variety of religious practices and ideas. Writing intensive. (Also offered as HIST 484.) 4 cr.

576. The Hebrew Bible in Historical Context
An introductory study of the Hebrew Bible, or Old Testament, examining the development of biblical literature in the context of ancient Near Eastern cultures and history. Interpretations of the creation stories and patriarchal narratives using literary and folklore methods; the transformation of Israelite religion from Moses to David to Ezra; the role of prophets and nature of ancient prophecy; the concept of the messiah; "wisdom" literature and the biblical interpretations of misfortune; the formation of a biblical canon; and the critical analysis of sacred texts. Writing intensive. (Also offered as HIST 576.) 4 cr.

577. The New Testament in Historical Context
A study of the collection of writings known as the New Testament as both literature and historical documentation. Assigned readings from primary and secondary sources stress the historical, social, religious, and literary backgrounds of gospels, Paul's letters, and the Apocalypse, and will include a variety of early Christian texts left out of the canonical New Testament. Other more general themes are: the formation of the Christian canon, the division of the Jesus-movement from Judaism, the status of Jesus in his own time, the nature of parables, the end of the world, and the authority of women in early churches. Emphasis on the historical understanding of sacred scripture. Writing intensive. (Also offered as HIST 577.) 4 cr.

607. Religion in American Life and Thought
Interdisciplinary study of the varied nature of American religious experience and its relationship to other aspects of American culture. Topics vary from year to year, and may include, for example: the interdisciplinary study of a spiritual community, African American religious history, material

culture and spiritual expression, politics and religious free speech, religious culture in the nineteenth century, multi-ethnic religions and literature. (Also offered as AMST 607.) 4 cr.

682. Cults and Charisma
Examines religious sects and charismatic leaders using case studies from history and the contemporary world, as well as analytical principles from religious studies and anthropology. Explores various approaches to the question, what makes a person powerful over others?, in connection with the formation of messianic sects, the genesis of the "cult," the traditional authority of priests and kings, sainthood, the events at Jonestown and Waco, and the popular image of the "cult." Students learn to employ a variety of tools and models to understand historical situations of charismatic leadership. (Also offered as HIST 682.) 4 cr.

Reserve Officer Training Corps

(For program description, see page 109.)
(See Aerospace Studies and Military Science.)

Russian (RUSS)

Department of Languages, Literatures, and Cultures
(See department note, page 31; program description, page 46; faculty listing, page 178.)

Coordinator: Arna B. Bronstein

New students will be assigned to the proper course on the basis of proficiency tests. A student may not receive UNH credit for elementary Russian courses if he or she has had two or more years of secondary school Russian. If a significant number of years has elapsed since completion of the last course, a student may petition the department to take 400-level language courses for credit.

401–402. Elementary Russian
Oral-aural practice and written drills designed to achieve a mastery of basic grammatical patterns. Language lab and computer lab work. For students without previous training in Russian. Special fee. 4 cr.

425. Introduction to Russia: Contemporary Society and Culture
Introduction to contemporary Russian society and culture in English. Examines the "Russian mind," (as it was formed before 1917), the "Soviet mind," and how the two have clashed. A closer examination of how the Russians are adapting to the changes that have taken place in their country since the collapse of communism. Readings, films, realia. Themes to be discussed include leadership; authority and power; the Russian soul; family, women, youth, education, holidays and celebrations; and the new Russians. (Also listed as WLCE 425R.) Special fee. 4 cr.

500. Selected Topics in World Literature
Topics will be chosen which introduce students to major themes and genres. (Also offered as CLAS 500, FREN 500, GERM 500, ITAL 500, PORT 500, SPAN 500, WLCE 500.) May be repeated for credit. Writing intensive. 4 cr. Cr/F.

#502. Review Russian for Intermediate Students
Reviews the complete Russian declensional system, singular and plural, nouns, adjectives, possessives, and verb system (conjugations, aspectual usage, imperative usage and formation). Students successfully completing this course (with a C or better) should be able to continue their study in RUSS 504. Prereq: RUSS 402 or equivalent; permission. Special fee. 4 cr.

503-504. Intermediate Russian
Continuation of RUSS 401-402. Review of Russian grammar, and practice in oral and written expression. Prereq: RUSS 402 or equivalent high school or college course with a grade of C or better. Special fee. 4 cr.

521. Survey of 19th-Century Russian Literature in English
Selected masterpieces of 19th-century Russian literature. Pushkin, Gogol, Tolstoy, Dostoevsky, Chekhov, and others. Lectures and readings in English. Open to all students, including freshmen. Writing intensive. (Also listed as WLCE 521R.) Special fee. 4 cr.

522. Survey of 20th-Century Russian Literature in English
Selected masterpieces of 20th-century Russian literature. Chekhov, Pasternak, Bely, Bulgakov, Solzhenitsyn, and others. Lectures and readings in English. Open to all students, including freshmen. Writing intensive. (Also listed as WLCE 522R.) Special fee. 4 cr.

593. Major Russian Authors in English
In-depth discussion and analysis of major Russian authors or literary periods. A different author or period offered each semester. Lectures and readings in English. Open to all students. Not for major credit; majors must register for RUSS 693. Writing intensive. (Also listed as WLCE 593R.) Special fee. 4 cr.

601. Russian Conversation and Phonetics
Practical application of fundamental phonetic theory of spoken Russian. Designed to increase fluency and accuracy in conversation. Prereq: RUSS 504 with a grade of C or better; permission. Special fee. 4 cr.

631–632. Advanced Russian Conversation and Composition
Advanced spoken and written Russian designed to maintain aural-oral fluency; emphasis on translation and advanced grammatical structures. Prereq: RUSS 503-504 or equivalent with a grade of C or better. Special fee. 4 cr.

685, 686. Study Abroad
Studies at a Russian institution of higher learning. Interested students should consult with a Russian adviser. Prereq: primarily for juniors and seniors who have completed RUSS 632 or equivalent with a grade of B (3.00) or better. Special fee. Variable to 16 cr. Cr/F. (IA grade will be assigned until official transcript is received from the foreign institution.)

691. Readings in Russian Literature
Linguistic and stylistic characteristics of works of important authors of the 19th and 20th centuries. Readings, lectures, and papers entirely in Russian. Special fee. Writing intensive. 4 cr.

692. Drama
Examination of exemplary Russian plays. A play production in Russian emphasizing phonetic articulation, intonation, and fluency and allowing in-depth analysis of a particular text. Special fee. May be repeated for credit barring duplication of material. 4 cr.

693. Major Russian Authors
Same as RUSS 593, except that majors may do selected readings in Russian and conduct research assignments on a specified topic. Final project required. Special fee. 4 cr.

733. Advanced Language and Style
For students who have a strong, active control of grammar. The most difficult problems of Russian grammar and syntax in poetry and prose. Develops confidence in expression both in everyday situations and in abstract concepts (emphasis on the latter). Prereq: grade of C or better in last Russian language course taken. Special fee. Barring duplication of material, may be repeated for a maximum of 8 credits. 4 cr.

734. History and Development of the Russian Language
Overview of the changes in sounds, structure, and vocabulary from Proto-Indo-European through Old Church Slavonic, Old Russian, to contemporary Russian. Readings in culture and civilization parallel to the chronology of the studied linguistic period. Prereq: grade of C or better in last Russian course taken. Special fee. 4 cr.

791. Methods of Foreign Language Teaching
Objectives, methods, and techniques in teaching foreign languages from elementary grades through college. Discussion, demonstration, preparation of instructional materials, microteaching of the language skills. Prereq: permission. Special fee. 4 cr.

795, 796. Independent Study in Russian
Open to highly qualified juniors and seniors. To be elected only with permission of the section coordinator and the supervising faculty member or members. Barring duplication of subject, may be repeated for credit. 1–4 cr.

797, 798. Special Studies in Russian Language and Literature
Selected topics in language, culture, and literature. Barring duplication of subject, may be repeated for credit. 2 or 4 cr.

School of Health and Human Services (HHS)

(For program description, see page 67.)

510. AIDS: Health, Ethics, and Social Agenda
AIDS has become one of the most important health issues of our time. This course explores the medical, policy, financial, and ethical issues raised by society's efforts to respond to this "crisis." (Also offered as INCO 404S.) 4 cr.

540. Statistics for Health and Human Services Professionals
A conceptual and analytical approach to the use of statistics in the health and human service professions. Emphasis on the logic and purpose of statis-

tics. Attention to special problems of statistical design such as random assignment, single subject trials, and the ethics of control groups. Basic computer skills for manipulating data. No credit for students who have completed ADM 430; BIOL 528; DS 420; EREC 525; MATH 644; PSYC 402; SOC 502. Special fee. 4 cr.

640. Environmental and Occupational Health
Environmental health is the area of human ecology that studies the interrelationship between humans and their environment as it affects the health of the individual or groups. Occupational health examines the workplace as a significant source of discomfort, illness, injury, and death in the population. Traces the evaluation of environmental health across time and across many cultures. 4 cr.

#698. Special Topics
Explore areas related to specific professional health interests. May repeat but not duplicate subject areas. A) Communication Disorders; B) Health Management and Policy; C) Medical Laboratory Science; D) Nursing; E) Occupational Therapy; F) Kinesiology; G) Recreation Management and Policy; J) Family Studies; K) Social Work; L) Health Promotion; I, M-Z) Interdisciplinary. Prereq: permission. 1–4 cr. Cr/F.

798. Special Topics in Health and Human Services
Explores areas related to specific professional health interests. May repeat but not duplicate subject areas. A) Communication Disorders; B) Health Management and Policy; C) Medical Laboratory Science; D) Nursing; E) Occupational Therapy; F) Kinesiology; G) Recreation Management and Policy; J) Family Studies; K) Social Work; L) Health Promotion; I, M–Z) Interdisciplinary. Prereq: permission. 1–4 cr.

Social Science (SCSC)

681. Internships
Fieldwork in a state or local government department, agency, or institution, or in an approved private agency. Work will be under supervision of agency. Department chairperson or representative is responsible for arranging the program. Offered through departments of history, political science, psychology, sociology, and anthropology. Prereq: senior standing. Variable to 16 cr.

682. Washington Internship
(Coordinator: JoAnn Kelly)
Internship placements in Washington, D.C., through the Washington Center. Individual internships arranged with legislative and judicial offices, law firms, public interest organizations; in the arts, the media, labor, international affairs, business, consumer affairs. Supervision by agency personnel and faculty sponsor. Students should have above-average academic record before applying. Open to all majors. Applications available in the Whittemore School Undergraduate Programs Office, McConnell Hall. Prereq: junior or senior. Student must also register for a graded, 4-credit independent study in the student's major. Internship credit variable to 12 cr. Cr/F.

Social Work (SW)

(For program description, see page 77.)

Chairperson: Robert E. Jolley
Associate Professors: Jerry Finn, Robert E. Jolley
Assistant Professors: Mary Banach, Linda Rene Bergeron, Walter Ellis, Mary H. Essley, Jerry D. Marx, Suzanne McMurphy, Angie H. Rice, Sharyn J. Zunz
Instructors: Martha A. Byam, Susan A. Lord, Karen R. Oil, Martha H. Ortmann, Lee P. Rush

524. Introduction to Social Work
The role of social work within agency structures. Programs, policies, social work services studied in historical perspective; their auspices, goals, and operations for consumers from various ethnic, racial, and social groups. 40 hour/semester observational/participatory assignment at community agencies required. 4 cr.

525. Introduction to Social Welfare Policy
U.S. social welfare provisions: income, employment, and health care. Programs and policies in historical perspective: their auspices, goals, and operations for consumers from various social, racial, and ethnic groups. Writing intensive. 4 cr.

550. Human Behavior and Social Environment I
Introduction to human behavior and development as it influences and is influenced by multiple factors in the social environment, including individual genetic and biological composition, race, gender, age, socioeconomic status, ethnicity, geographic location, physical appearance, and ability. How these factors operate throughout the life cycle. Provides a knowledge base and perspective to understand a client's behavior, attitude, and values in relation to the attitudes and values of the social work professional and the larger society. 4 cr.

551. Human Behavior and Social Environment II
Continuation of 550. Agents of socialization that most significantly affect individual development and behavior, and a dynamic and changeable concept of social systems as they affect individual and group behavior in relation to the dominant society. Prereq: SW 550. 4 cr.

601. Research Methods in Social Work
Introduces students to practitioner-researcher role in social work. Critical evaluation of, and introduction to research including project design, survey and evaluative methodologies. Introduction to statistics used in research process. Each student completes an individual research project. Cannot be taken for credit after SOC 601 or PSYC 502. Prereq: junior or senior standing or permission. 4 cr.

622. Social Work Practice I
Introduction to methods and practice. Basic principles, values, and ethics. Interviewing skills, problem assessment, social contracting. Skills training in lab sessions. Should be taken in junior year. Prereq: SW 524 or permission. Writing intensive. 4 cr.

623. Social Work Practice II
Continuation of SW 622. Delineation and study of intervention and change strategies differentiated with individuals, groups, and communities. Prereq: SW 622. Writing intensive. 4 cr.

#633. Seminar in Social Work Methods
Analysis and comparison of change theories, intervention strategies, therapeutic techniques. Seminar format. Possible topics: techniques of group work, casework or community practice, behavior modification, and staff development and supervision. Prereq: senior major standing. 4 cr.

640. Social Welfare Field Experience I
Majors will be placed in a social welfare setting for a minimum of 225 hours; individual arrangements with faculty coordinator. Prereq: SW 622 and permission. Coreq: SW 640A. Special fee. (No credit toward a minor.) 5 cr. Cr/F.

640A. Social Welfare Field Experience I: Seminar
Seminar on campus. Prereq: SW 622 and permission. Coreq: SW 640. (No credit toward a minor.) Special fee. Writing intensive. 3 cr.

641. Social Welfare Field Experience II
A continuation of SW 640 with a minimum of 225 hours. Prereq: SW 640 and permission. Coreq: SW 641A. (No credit toward a minor.) 5 cr. Cr/F.

641A. Social Welfare Field Experience II: Seminar
Continuation of 640A. Prereq: SW 623 and permission. Coreq: SW 641. (No credit toward a minor.) Writing intensive. 3 cr.

697A–H. Special Topics in Social Welfare
Seminar for advanced majors. Topics may include: A) Alcohol and Alcoholism, B) Drugs and Chemical Dependency, C) Income Maintenance, D) Health Care, E) Child Welfare, F) Aging, G) Mental Health, or H) Developmental Disabilities. May be repeated for different topics. Prereq: permission. 4 cr.

#700. Social Gerontology
Theories, social problems, programmatic responses, and recent research on aging; emphasis on psychosocial forces. Prereq: senior status;/or permission. 4 cr.

701. Women and Aging
Analysis of the major theories about the social conditioning of aging women and its effect in contemporary society. Human service response. Psychosocial, biological, legal, and economic implications. Prereq: senior status or permission. 4 cr.

705. Child Welfare: Policies, Programs, and Practice
Examination of the major policy and program questions of child welfare with a focus on child care and protection, adoption and foster care, juvenile delinquency, service delivery, and concepts of treatment in public and private programs. Prereq: senior status or permission. 4 cr.

710. Computer Utilization in Social Work
Provides students with a basic understanding of computerization and its application in social work. Computer literacy is seen as a requirement for the effective practice of social work for the 1990s and beyond. 4 cr.

711. Social Work and Mental Illness
An overview of the public mental health system focusing on people affected by severe and persistent mental illness. Reviews the current service system and its history; major mental illness, psychosocial rehabilitation, and treatment; and com-

munity support systems. Prereq: Senior status or permission. 4 cr.

712. Social Work and Developmental Disabilities
Analysis of the complex social contexts of people with developmental disabilities. Explores and questions traditional approaches and the current service system. Examines family and community services and resources. Prereq: Senior status or permission. 4 cr.

715. Practice with Gay, Lesbian, and Bisexual Clients
Sexual minorities constitute the minority group social workers will most consistently encounter wherever they work. Addresses practice with gay, lesbian, and bisexual people on both professional and personal levels for the social worker. The readings will include theoretical, experimental, clinical, counseling, and personal perspectives, as well as providing an introduction to the gay/lesbian/bisexual subculture. A unit on gender minorities will be included. Students will also be required to explore and examine their own attitudes and assumptions about gays, lesbians, bisexuals, and gender minorities. Senior status only. (Also offered as SW 815.) 4 cr.

795. Independent Study in Social Service
Independent work under department faculty guidance. Enrollment by permission only through arrangement with specific faculty. May be repeated with a different focus to maximum of 8 credits. Prereq: 12 hours social service coursework; permission. Variable 1–6 cr. Cr/F.

796. Independent Study: Teaching Assistantship
Participating students provide leadership and supervision for small groups of majors in social work practice simulations. Student teaching assistants work closely with, and under the direction of, department faculty. May be repeated to a maximum of 8 credits. Prereq: senior status; 16 hours in social work; and permission. Variable 2 or 4 cr. Cr/F.

797H-798H. Honors Thesis
Working with an assigned faculty adviser, students propose and develop a thesis project for both oral and written presentation before the end of the semester. Prereq for 797H: admission to the SW honors program; permission. Prereq for 798H: satisfactory completion of 797H; permission. Variable credits: 2–4 per semester; 6 cr. maximum for both semesters.

Sociology (SOC)

Department of Sociology and Anthropology
(For program description, see page 46; see also additional course listings under Anthropology.)

400/400W. Introductory Sociology
Overview of sociology as the scientific study of human social and cultural relationships. Social theory, methods and techniques of research, and current research findings on a wide range of social issues. 400H and 400W are writing intensive. 4 cr.

500/500W. Self and Society
Introduction to sociological social psychology. Focus on ways in which individual and society are inextricably conected, each producing and reproducing the other. Particular attention paid to the sociological concern with the production and maintenance of inequality. 500W is writing intensive. 4 cr.

502. Statistics
Elementary applied statistical techniques; tables, graphs, cross-classifications; central tendency and dispersion; correlation and linear regression; confidence intervals and hypothesis testing. No credit for students who have completed ADM 430; BIOL 528; DS 420; EREC 525; HHS 540; MATH 644; PSYC 402; but petitions for acceptance of such courses to fulfill the sociology major requirement in statistics will be entertained. 4 cr.

515. Introductory Criminology
Introduction to the scientific study of crime. Review of the different forms of criminal behavior, theories of crime, and strategies of crime control. 4 cr.

520. The Family
Sociological study of marriage and the family in American society. Following a life-cycle approach, topics include gender roles, communication and conflict, dating and mate selection, work and family economics, the transition to parenthood, middle- and late-life family, divorce, and remarriage. 4 cr.

525. Juvenile Crime and Delinquency
Crime, violence and the criminal justice system as it affects children and youth in the role of both perpetrators and victims. 4 cr.

530/530W. Race and Ethnic Relations
Majority-minority group relations; special attention to nature and results of black-white and ethnic group relations in the United States. 530W is writing intensive. 4 cr.

540/540W. Social Problems
Relation of customs and institutions to such social problems as crime, delinquency, alcoholism, physical and mental disease, sexual deviance, poverty, old age, broken families, and racial and religious prejudices. Especially for nonmajors. 540W is writing intensive. 4 cr.

570. Sexual Behavior
A comparative approach to questions of the universality and variability of human sexual behavior. Topics include the changing expression of sexuality at various stages of the life cycle, patterns of arousal and response for each sex, the social control of sexuality, and sexual dysfunctions. 4 cr.

580. Arts in Society
Students attend live concerts of "classical" music, dance, opera, and theatre; as well as visit art museums and architectural monuments in the region. Assigned readings and introductory lectures precede the performances and art trips, and response papers and discussion follow them. While exposure to "live" art is primary, events are related to other institutions that constitute society—the family, education, the economy, religion, and government, again through assigned readings, lectures, and discussion. (Also offered as INCO 480.) Special fee. 4 cr.

597. Special Topics in Sociology
Occasional or experimental offerings. May be repeated for different topics. 4 cr.

599/599W. Critical Analysis in Sociology
Basic skills essential to the study of sociology; development of critical reading of sociological literature through the practice of systematic evaluation of evidence and the process of theory construction; written and oral analysis of sociological classics; use of library resources. To be taken by sociology majors only no later than the junior year. 599W is writing intensive. 4 cr.

601. Methods of Social Research
Overview of major research methods: survey analysis, personal interview, participant observation, content analysis, and experimental design. Each student designs and completes a research project. Prereq: junior or senior standing. 4 cr.

611/611W. History of Social Theory
Analysis of the writings of major contributors to the development of sociological theory from Plato to Max Weber. Special emphasis given to works of Marx, Weber, and Durkheim. 611W is writing intensive. 4 cr.

612/612W. Contemporary Sociological Theory
Major schools, concepts, and issues in present-day sociological theory. Readings on functionalism, conflict theory, systems theory, critical theory, and hermeneutics. 612W is writing intensive. 4 cr.

#620. Studies in Social Psychology
Application of basic concepts of social psychology to a series of studies involving theoretical, methodological, and substantive issues. Prereq: SOC 500. 4 cr.

625. Female, Male, and Society
Critical, cross-cultural study of gender-related behavior in historical as well as contemporary perspective. Draws on anthropological, social-psychological, and sociological literature. (Also offered as ANTH 625.) 4 cr.

630. Sociology of Gender
Gender examined as (1) socially constructed differences between the sexes, and (2) a system of social relations which are part of the fabric of our social institutions. Topics include: gender socialization, gender and education, gender and employment, and work-family intersections. Attention paid to the issue of gender inequalities and to the intersection of class, culture, race-ethnicity, age, and sexual orientation with gendered experience and gendered institutions. Focuses primarily on the contemporary United States. 4 cr.

635/635W. Medical Sociology: Organization and Processes of Modern Medicine
Interrelationship of health, medicine, and society; the social construction of wellness, illness, and healing; age, sex, class, and ethnicity in medical care; institutional networks and the social control functions of medicine; roles and relations of physicians, patients, nurses, and other health workers; medicine in a cross-national context. 635W is writing intensive. 4 cr.

645/645W. Class, Status, and Power
Focuses on the major dimensions of inequality, including class, gender, and race, by exploring the distribution of economic, political, and social resources within contemporary societies. Prereq: SOC 400. 645W is writing intensive. 4 cr.

650. Family Violence
Various forms of family and intimate violence, including child physical abuse, sexual abuse, spouse assault, dating violence and elder abuse, their characteristics and dynamics, place within larger social trends, the theories that explain their occurrence and effects and the major social institutions that respond to them. Juniors and seniors only. 4 cr.

655. Sociology of Crime and Justice
Systematic study of how social factors, such as inequality, differentiation, culture, and organization, influence the justice process. Historical and cross-cultural focus on the behavior of the police, courts, and other legal institutions. Prereq: SOC 515 or permission; juniors and seniors only. 4 cr.

660/660W. Rural-Urban Sociology
Application of sociological and social-psychological principles to the study of populations at various points on the rural-urban continuum. 660W is writing intensive. 4 cr.

665/665W. Environmental Sociology
Interactions between society and the physical environment, including: environmental constraints; population and economic growth; social impacts of resource development; large-scale environmental change; and the social bases of environmental attitudes, behavior, and politics. 665W is writing intensive. 4 cr.

670. Sociology and Nonfiction Film
Examination of nonfiction film as both a method of exploring social life and a cultural product that reflects its social environment. Among the topics to be addressed include the use of photographic images in social science research, the historical development of documentary film, and the critical analysis of visual images. 4 cr.

675. Sociology of AIDS
Seminar class addresses social, political, emotional, and bioethical dimensions of HIV infection and AIDS. Specific topics include the social epidemiology and etiology of AIDS, stigmatization and the social construction of disease, community action, AIDS prevention, and ethical issues in the health care of people with AIDS. 4 cr.

#680. Sociology of the Holocaust
Examination of the origins, realities, and consequences of the Holocaust as an all-embracing European phenomenon. Topics include the genocidal policies and procedures of the Nazis and Soviets with respect to indigenous populations as well as the role of collaborators. This course is normally offered only at UNH-Manchester. 4 cr.

685. Work and Occupations
Examination of the changes in workplace organization and workers' lives as the U.S. became first, an industrial society, and later, a postindustrial nation. Emphasizes how and why workers' rights have been contested as well as how and why racial, ethnic, and gender segmentation emerged and persist. 4 cr.

697. Special Topics in Sociology
Occasional or experimental offerings. May be repeated for different topics. Writing intensive. 4 cr.

699. Senior Thesis
Independent work in the library or field; recommended for, but not confined to, majors intending to pursue graduate studies; required for honors candidates. Contact staff to obtain approval and arrange supervision from two faculty members. Should be initiated by next-to-last semester. 4–8 cr.; in latter case to extend over two semesters.

715. Criminological Theory
Examines the major schools of criminological thought. Traditional perspectives—learning, control, strain, and labeling theories—are covered, as are more contemporary approaches, including Marxian, feminist, rational-choice, routine-activities, and structural theories. Prereq: SOC 515. 4 cr.

#720. Current Developments in Sociology of the Family
Current topic selected each semester, such as stratification and the family, intrafamily communication, power structure of the family, kinship in modern societies. Critical review of the literature; class or individual research project usually carried out. Prereq: 8 credits of sociology; SOC 520 recommended. 4 cr.

#730. Political Sociology
Contemporary issues in political sociology, with emphasis on the relationship between social class structure and political power. Seminar explores various perspectives on the nature and distribution of power, theories of the state, class structure and political participation, and the politics of policy making. 4 cr.

#735. Complex Organizations
Comparative and historical study of the structure and dynamics of complex organizations (business, military, scientific, political, educational, medical) in their various environments: power and social control, structure and technology, size and performance, environments and adaptation. 4 cr.

741. Social Change and Societal Development
Comparative, interdisciplinary approach. Interrelationships among economic, political, and social factors in determining the structure, dynamics, character, and level of development of societies. 4 cr.

760. Aging and Late Life Family
Using a life course perspective, this course focuses on family relationships and social role transitions in later life. Addresses the impact of the empty-nest stage, grandparenting, retirement, care giving, and widowhood on the well-being and relationships of older people. Prereq: junior or senior. 4 cr.

#761. Population Studies
Major population trends including changes in birth and death rates, population characteristics, mobility, migration, world population growth, population problems, and policies of countries at different stages of economic development. Interrelationship of population and society. 4 cr.

780. Social Conflict
Analysis of the social conditions associated with the major forms of conflict management in human societies: discipline, rebellion, vengeance, negotiation, mediation, law, therapy, supernaturalism, and avoidance. 4 cr.

785. The Study of Work
Understanding society through the structure of work. Case studies, in an ethnographic manner, of high-status and low-status occupations to provide understanding of social processes and interrelationships in the social structure. 4 cr.

#790. Applied Sociology
(1) Current level of use of sociological knowledge; (2) the advocate, consultant, and researcher roles in applied settings; (3) techniques of applied research; (4) implications of applied sociology, including ethical problems. Each student will focus on a social problem and write a paper covering the above issues. Applied projects where possible. Prereq: SOC 601. 4 cr.

792. Research Internship
Designed for students who want some practical experience applying social research methods in a program or policy setting. Students meet together weekly to discuss their experiences in the internship placement. Students design and carry out research in the setting of the placement. Placements are to be arranged by student and faculty member together. Examples of placements include community development agencies, social service agencies, nonprofits, research centers and companies. Major report on the research undertaken is required. Prereq: SOC 502, 599, 601, permission. 4 cr.

794. Evaluation of Social Programs
Evaluation research defined: purposes of evaluation; design of evaluation studies; setting of programs; utilization of evaluation results. Examination of case studies of evaluations of social programs. Students are responsible for designing an evaluation study in their chosen substantive area. Prereq: SOC 601. 4 cr.

795, 796. Reading and Research in Sociology
A) Communications; B) Criminology; C) Culture Change; D) Culture and Personality; E) Deviant Behavior; F) Family; G) Population; H) Rural-Urban; I) Social Control; J) Social Differentiation; K) Social Movements; L) Social Psychology; M) Social Research; N) Social Theory; O) Applied Sociology; P) Medical Sociology. Prereq: 12 credits of sociology or permission. 2–8 cr.

797. Special Topics in Sociology
Occasional or experimental offerings. May be repeated for different topics. 4 cr.

Soil Science (SOIL)

Department of Natural Resources
(For program description, see page 90; for faculty listing, see page 191; see also course listings under Environmental Conservation, Forestry, Natural Resources, Water Resources Management, and Wildlife Management.)

501. Introduction to Soil Sciences
An overview of physical, chemical, and biological properties of soil. Sub-disciplines of soil chemistry,

soil physics, soil microbiology, soil genesis, and classification. Prereq: CHEM 403 or equivalent. Special fee. Lab. 4 cr.

601. Field Description of Soils
Description of soils in the field. Application of soils properties to forestry, plant science, and community planning. Strong orientation to fieldwork. Prereq: SOIL 501 or permission. Permission required for water resources, soils, or forestry majors. Special fee. Lab. 3 cr.

607. Soil and Land Evaluation
Field and lecture course emphasizing application of USDA Soil Taxonomy and Soil/Land-use interpretations to soils, landscapes, parent materials. Students gain on-site practice in preparing detailed soil descriptions, classifications, and interpretations, and participate in collegiate soil judging meets. Prereq: SOIL 501. Special fee. Lab. 2 cr.

609. Soils and Community Planning
Using a town plan and soils map, students develop reports for multiple urban and rural land use—housing, sewage, recreation, transportation, runoff, etc. USDA soil classification system; Soil Conservation Service rating criteria; New Hampshire soils. Guest lecturers. 2 cr.

611. Soils and Environmental Quality
An in-depth look at soil as an environmental component. The role of soil in global nutrient cycling. Soil control of pollutant levels in air and water. Effect of pollutants on soil processes and the effect of soil processes on pollutants. Prereq: SOIL 501 or equivalent. 4 cr.

702. Chemistry of Soils
Chemical composition of soil, colloidal phenomena and the exchange and fixation of elements, cation exchange capacity and source of negative charge, inorganic reactions in soil and their effect on soil properties. Prereq: one year college chem. or permission. 3 cr.

703. Chemical Analysis of Soil
Methods of soil chemical analysis. Coreq: SOIL 702. Prereq: SOIL majors or permission. Not available for graduate credit. Lab. 1 cr.

704. Soil Genesis and Classification
Processes involved in formation of soils, soil properties as reflectors of genetic processes. Classification systems of soils related to soil genesis and soil landscapes. Lab sessions illustrate concepts by examining soils in the field. Prereq: SOIL 501 or equivalent. Special fee. Lab. 4 cr.

705. Forest Soils
Basic ecological and management perspectives; soil-site quality evaluation; forest land classification and interpretation; forest soil management techniques. Prereq: SOIL 501, FOR 527 or permission. Lab. Writing intensive. 4 cr. (Not offered every year.)

706. Soil Microbiology
Soil as a medium for micorbial growth; the relationships and significance of microbes to mineral transformations, plant development, and environmental quality, as governed by environmental issues. Prereq: BIOL 412 or PBIO 412, CHEM 545 or PBIO 501 or equivalent; or permission. 3 cr.

#708. Soil Physics
Physical properties of soils and how they relate to the movement of water, solutes, and contaminants in saturated and unsaturated soils. Methods of measuring and characterizing soil physical properties. Applications to environmental problems, including land-based disposal systems, hazardous waste site investigation and remediation, and soil-water management. Prereq: basic courses in mathematics, chemistry, and physics or permission. 3 cr. (Not offered every year.)

795. Independent Work in Soil Science
Topics may include soil-plant relationships, physics of soils, chemistry of soils, soil classification, forest soils, soil microbiology, or teaching experience. Prereq: permission. 1–4 cr.

Spanish (SPAN)

Department of Languages, Literatures, and Cultures
(See department note, page 31; program description, page 47; faculty listing, page 178. See also course listings under Portuguese.)

Coordinator: William F. Forbes

New students will be assigned to the proper course on the basis of their scores on the departmental placement test, the College Board Achievement Test or number of years of previous study. Transfer credit will not be given for elementary-level college courses in foreign languages if a student has had two or more years of the foreign language in secondary school. No student educated in a foreign country or for whom Spanish is the native tongue will be permitted to register for any Spanish course numbered 649 or below, except 601. All courses conducted in Spanish except where noted. In the 401-632 range, a grade of C or better is required to advance to the next course in the language series.

401–402. Elementary Spanish
For students without previous knowledge of Spanish. Aural-oral practice; fundamental speech patterns; reading and writing to achieve a firm basis for an active command of Spanish. Labs. No credit toward a major. (No credit for students who have had two or more years of Spanish in secondary school; however, any such students whose studies of Spanish have been interrupted for a significant period of time should consult the chair about possibly receiving credit.) Special fee. 4 cr.

#407. Accelerated Spanish
SPAN 401-402 in one semester. Study of fundamental speech patterns, reading, and writing to achieve a firm basis for active command of Spanish. Labs. Previous knowledge of Spanish is not required. (No credit for students who have had two or more years of Spanish in secondary school; students whose studies of Spanish have been interrupted for a significant period of time should consult the chair about possibly receiving credit.) Special fee. 8 cr.

500. Selected Topics in World Literature
Topics will be chosen which introduce students to major themes and genres. (Also offered as WLCE 500, GERM 500, ITAL 500, CLAS 500, FREN 500, PORT 500, RUSS 500.) May be repeated for credit. Writing intensive. 4 cr.

501. Review of Spanish
Emphasis on aural-oral practice; review of basic structure; reading and writing to develop active command of the language. Labs. Designed for those whose study of Spanish has been interrupted for a significant amount of time and for those who have had only two years of high school Spanish. Special fee. 4 cr.

503-504. Intermediate Spanish
Emphasis on the development of reading, writing, speaking, and listening skills. Review of grammar. Discussion and short papers in Spanish based on cultural and literary readings. Films. No credit toward the major. Special fee. Lab. 4 cr.

521. Spanish and Portuguese Literature in Translation
Major works by principal authors, such as: Camõens, Cervantes, Lope de Vega, Calderón, Eça de Queiroz, Unamuno, Ortega y Gasset, García Lorca, Casona, etc. Readings, discussions, papers in English. Does not count for Spanish major. (Also listed as WLCE 521S.) May be repeated. Special fee. 4 cr.

522. Latin American and Brazilian Literature in Translation
Major works by principal authors, such as Inca Garcilaso, Díaz del Castillo, Machado de Assís, Borges, Asturias, Neruda, E. Veríssimo, Fuentes, Leñero, Guimarães Rosa, and Jorge Amado. Readings, discussion, papers in English. Does not count toward Spanish major. (Also listed as WLCE 522S.) May be repeated. Special fee. 4 cr.

525. Spanish Civilization and Culture
Historical, geographical, and artistic expressions of Spanish civilization that have formed the character of contemporary Spanish culture. Readings, slides, films, tapes, and records. Conducted in English. Majors must take either 525 or 526, but both may not be counted for major credit. (Also listed as WLCE 525S.) Special fee. 4 cr.

526. Latin American Civilization and Culture
Significant historical, geographical, and artistic expressions of pre-Colombian and Latin American civilization. Readings, slides, films, tapes, records. Conducted in English. Majors must take either 525 or 526, but both may not be counted for major credit. (Also listed as WLCE 526S.) Special fee. 4 cr.

601. Spanish Phonetics
Practical application of fundamental phonetic theory to spoken Spanish. Required of Spanish majors. Special fee. 4 cr.

631, 632. Advanced Spanish Conversation and Composition
To maintain and perfect written and spoken Spanish through intensive classroom work, individual conferences, and laboratory sessions. Discussion and frequent papers in Spanish based on cultural and literary readings, audiotapes, and videos. Prereq: SPAN 504 or equivalent. Special fee. 4 cr.

One course from SPAN 650, 651, 652, 653, 654 (or an equivalent course) is prerequisite to all higher literature courses in Spanish.

650. Introduction to Critical Analysis
Methods and practice of literary criticism. Critical analysis of representative essays, fiction, poetry, and

drama from Spain and Latin America. Frequent short papers. Required of Spanish majors; should be taken concurrently with or immediately following Spanish 632. Special fee. Writing intensive. 4 cr.

651, 652. Introduction to Spanish Literature and Thought
Reading and analysis of major works within the historical, cultural, and social background of the Iberian peninsula. Papers, discussion, and examinations in Spanish. Prereq: SPAN 631, 632. May be taken concurrently with SPAN 632 with permission of adviser. Special fee. 4 cr.

653, 654. Introduction to Latin American Literature and Thought
Reading and analysis of major works within the historical, cultural, and social background of the New World. Papers, discussion, and examinations in Spanish. Prereq: SPAN 631, 632. May be taken concurrently with SPAN 632 with permission of adviser. Special fee. 4 cr.

685, 686. Study Abroad
Studies at a Spanish or Latin American university. Prereq: primarily for juniors and seniors who have passed SPAN 503-504 or equivalent with grade of B (3.00) or better. Noncredit orientation meetings required during semester prior to departure. Interested students should consult with the program directors. Special fee. Variable to 16 cr. Cr/F. (An IA grade will be assigned until official transcript is received from the foreign institution.)

#691, 692. Readings in Current Periodicals
Advanced practice in reading, speaking, and writing, based on current events in contemporary periodicals of the Spanish-speaking world. May be repeated. Pre- or coreq: SPAN 632 or equivalent. Special fee. 2 cr.

733. History of the Spanish Language
Evolution of the Spanish language from the period of origins to the present. Special fee. 4 cr.

#752. Drama and Poetry of the Siglo de Oro
Social and historical background of the baroque period. Representative plays of Lope de Vega, Tirso de Molina, Calderón; lyric poetry of Lope, Góngora, and Quevedo; prose developments. Prereq: SPAN 652 or 654 or equivalent. Special fee. 4 cr. (Not offered every year.)

#754. The Age of Cervantes
Study of the major works of Cervantes and his contemporaries in the context of the historical, literary, and social currents of the times. Prereq: SPAN 652 or 654 or equivalent. Special fee. 4 cr. (Not offered every year.)

755. Literature of the 19th Century
Larra, Espronceda, Bécquer, Pérez Galdós, and Blasco Ibáñez. Romanticism, realism, and naturalism. Prereq: SPAN 652 or 654 or equivalent. Special fee. 4 cr. (Not offered every year.)

756. Modern Spanish Poetry
Study of selected Spanish poets of the 18th, 19th, and 20th centuries in the context of historical, literary, and social currents of the time. Prereq: SPAN 652, 654, or equivalent. Special fee. 4 cr. (Not offered every year.)

#757. Spanish Drama of the 20th Century
Study of selected Spanish dramatic works of the 20th century in the context of the historical, literary, and social currents of the times. Prereq: SPAN 652, 654, or equivalent. Special fee. 4 cr. (Not offered every year.)

758. Spanish Prose of the 20th Century
Novels, short stories, and essays. Unamuno, Baroja, Menéndez Pidal, Ortega y Gasset, Julián Marías, Aranguren, Pérez de Ayala, Gironella, and Cela; survey of contemporary prose. Prereq: SPAN 652, 654, or equivalent. Special fee. 4 cr. (Not offered every year.)

#760. Unamuno and Ortega y Gasset
Philosophical ideology and literary content of major contributions of Miguel de Unamuno and Jose Ortega y Gasset. Prereq: SPAN 652, 654, or equivalent;/or permission. Special fee. 4 cr. (Not offered every year.)

#771. Latin American Drama
From pre-Hispanic origins to the present, modern playwrights of Mexico and Puerto Rico. Prereq: SPAN 652, 654, or equivalent. Special fee. 4 cr. (Not offered every year.)

772. Latin American Novel
Development from romanticism to the present; contemporary trends and techniques. Prereq: SPAN 652, 654, or equivalent. Special fee. 4 cr. (Not offered every year.)

773. Latin American Short Story
Representative authors; stress on 20th century. Principles of interpretation. Prereq: SPAN 652, 654, or equivalent. Special fee. 4 cr. (Not offered every year.)

774. Major Latin American Authors
Works and lives of selected writers; pertinent historical circumstances. Prereq: SPAN 652, 654, or equivalent. Special fee. 4 cr. (Not offered every year.)

790. Grammatical Structure of Spanish
Overview of the grammatical structure of Spanish through in-depth analysis of both morphology and syntax, with emphasis on the meaningful contrasts within the Spanish language and the grammatical contrasts between Spanish and English. Special fee. 4 cr.

791. Methods of Foreign Language Teaching
Objectives, methods, and techniques in teaching foreign languages from elementary grades through college. Discussion, demonstration, preparation of instructional materials, microteaching of the language skills. Prereq: permission. Special fee. 4 cr.

#795. Independent Study
Guided individual study with training in bibliography and organization of materials. Topics selected by instructor and student in conference. Barring duplication of content, may be repeated for credit. Prereq: permission of major supervisor. 1–4 cr.

797. Special Studies in Spanish Language and Literature
A) History of the Spanish Language; B) Medieval Spanish Literature; C) Spanish Literature of the Renaissance; D) Spanish Literature of the Golden Age; E) Spanish Literature of the 18th and 19th Centuries; F) Spanish Literature of the 20th Century; G) Contemporary Spanish Literature; I) Latin American Literature of the 16th and 17th Centuries; J) Latin American Literature of the 18th and 19th Centuries; K) Latin American Literature of the 20th Century; M) Contemporary Latin American Literature; N) Structural and Applied Linguistics; O) Spanish Literary Criticism; P) Latin American Essay; Q) Latin America; S) Spanish Theatre; T) Spanish Poetry; U) Latin American Poetry; V) Galdós; W) Archetype Latin American Literature; X) Special Teaching Problems; Y) Spanish Civilization and Culture; Z) Latin American Civilization and Culture. Specialized courses covering topics not normally presented in regular course offerings. Prereq: permission of major supervisor. Special fee. 4 cr.

798. Special Studies in Spanish Language and Literature
A) Historic Minorities of the United States; B) Portuguese; C) Hispanic Film; D) Introduction to Hispanic Linguistics; E) Hispanic Dialectology; F) Other. Specialized courses covering topics not normally presented in regular course offerings. Barring duplication of content, topic F may be repeated for credit. Prereq: permission of major supervisor. Special fee. 4 cr.

799. Senior Honors
For senior Spanish majors with a minimum cumulative grade-point average of 3.20 and the same or better average in the major who want to undertake a special honors project in an area of Spanish language or literature of their choice. Prereq: permission. 4 cr.

Technology (TECH)

Roy B. Torbert, Chairperson

The following courses are not necessarily offered every year.

400. Introduction to CEPS Programs
An overview of programs offered by the College of Engineering and Physical Sciences with an emphasis on career opportunities and professional development. Required course of all undeclared majors in CEPS. 1 cr. Cr/F.

564. Fundamentals of CAD
Fundamentals of CAD and computer-based graphics including using CAD as a design tool to create engineering drawings. AutoCAD and Softdesk Civil software used to cover the following topics: drawing file storage and retrieval, display functions, basic drawing and editing commands, symbol libraries, plotting drawings on paper, and using parametric design features in the CAD system. Basic DOS familiarity is assumed. Prereq: civil engineering majors only. Special fee. Lab. 3 cr.

583. Technology: Cultural Aspects
Study of the requirements, limitations, benefits, and hazards that are constraints on the development of technological systems. Prereq: prior courses in physics or chemistry at high school level; sophomore or higher standing at UNH; not open to CHE, CIE, EE, or ME majors; permission. 4 cr.

685. Budapest Program
Enables students to pursue a semester of study at the Technical University of Budapest. For information, contact the Dean's Office, College of Engineering and Physical Sciences. Prereq: CEPS students only. 0–20 cr. Cr/F.

696. Independent Study
Open to qualified students pursuing studies that do not fall within existing departmental areas. 1–4 cr.

797. Undergraduate Ocean Research Program
Students work as members of interdisciplinary project teams on contemporary ocean-related problems under the guidance of a faculty adviser. Student team defines problem, prepares a budget, conducts literature surveys, engages in dialogue with experts in the ocean community, deals with vendors, designs and builds a working engineering model, gathers and analyzes scientific data or conducts a comprehensive study, makes interim reports, and defends the results before a jury of experts. Prereq: normally senior standing and permission of the program director. A yearlong effort: 2 credits each semester, 4 credits total, an IA grade given at the end of the first semester. Writing intensive. 4 cr.

Theatre and Dance (THDA)

Department of Theatre and Dance
(For program description, see page 47.)

Chairperson: H. Gay Nardone
Professor: Carol Lucha-Burns
Associate Professors: Joan W. Churchill, H. Gay Nardone, David L. Ramsey, David M. Richman, Charles L. Robertson
Assistant Professors: Julie Brinker, David J. Kaye
Instructors: Carol J. Fisher, Ruth J. Grossen
Lecturers: Sarah Jane Marschner, Daniel J. Raymond, Nancy E. Saklad

Dance

#461. Modern Dance I
Introductory course that includes techniques and improvisation as well as lectures in history and theory. Students who have had several years of modern dance are expected to register for THDA 561. Instructor will determine appropriate level. Not open to seniors. 4 cr. (Not offered unless funding becomes available.)

462. Ballet I
Introductory course: technique; historical development of ballet. Students who have had several years of ballet are expected to register for THDA 562 or 662. Instructor will determine appropriate level. Not open to seniors. 4 cr.

463. Theatre Dance I
Introductory course: techniques; improvisation; lectures on jazz, ethnic, and other theatrical dance forms. Students with prior experience are expected to register for THDA 563 or 663. Instructor will determine appropriate level. Not open to seniors. 4 cr.

487. The Dance
Historical and philosophical consideration of dance trends. Not a performance course. 4 cr.

#561. Modern Dance II
Intermediate-level course that includes techniques and improvisation. (Not offered unless funding becomes available.) May be repeated for credit. 2 cr.

562. Ballet II
Extension of Ballet I syllabus; emphasis is on technique, with additional step vocabulary. May be repeated once for credit. Prereq: THDA 462 or permission. 2 cr.

563. Theatre Dance II
Technique; African-Cuban, modern, and East Indian dance; body movement through exercise and combinations involving stretch, strength, and flexibility. May be repeated for credit. Prereq: THDA 463 or permission. 2 cr.

576. Pointe
Intermediate course in the art of dancing on pointe. Focus on technique involved in gaining strength and on methodology for understanding the art of the ballerina. 2 cr.

586. Dance Pedagogy
Introduction to the art and science of teaching the movement forms of ballet, modern, jazz, and tap. Provides a general background into the nature of teaching, standards that make up good teaching, and methods of teaching dance that allow for technical proficiency to develop. Students focus on pedagogic approaches to learning their art and craft. 4 cr.

597. Dance Theatre Performance
Designed for students participating in UNH Dance Theatre Company. Skill development through rehearsal and actual performance experience. 2 cr.

633. Dance Composition
Practical, developmental approach to process of creating dances. Prereq: THDA 561; 562; 563;/or permission. 4 cr.

#640. Labanotation
Study and practice of recording human movement by the method of labanotation. Not offered every semester. 2–4 cr.

#661. Modern Dance III
Advanced-level course in technique and composition. Prereq: THDA 561 or permission. May be repeated for credit. 2 cr. (Not offered unless funding becomes available.)

662. Ballet III
Advanced-level course in technique; pointe work included. May be repeated for credit. Prereq: THDA 562 or permission. 2 cr.

663. Theatre Dance III
Extension of Theatre Dance I and II; brings students to a more advanced technical level. May be repeated for credit. Prereq: Theatre Dance II. 2 cr.

#684. Special Topics
Exploration of topics agreed upon by students and instructor. Topics vary. May be repeated. 2–4 cr.

732. Choreography
Theoretical and practical consideration of the creative and aesthetic aspects of ballet, modern, and theatre dance. Prereq: THDA 633. 4 cr.

Theatre

435. Introduction to Theatre
Introduces all aspects of theatrical production: play writing, acting, directing, design, technical theatre and construction, and theatre management. Cultural and social context of theatre in our time and through the ages. Introduces major classical and modern types of theatre. Selected plays are read and discussed, and attendance at theatrical production is required. Special fee. 4 cr.

436. History of Theatre I
History and theory in its social framework from the beginnings to 1700. Writing intensive. 436H is also writing intensive. 4 cr.

438. History of Theatre II
1700 to present. Writing intensive. 438H is also writing intensive. 4 cr.

#441. Exploring Theatrical Process
Develops the idea that drama is the revelation of character through action. Students explore the myriad connections between theatre and the life it imitates, concentrating on gesture, movement, speech, and other forms of behavior as manifestations of character on and off the stage. Diverse approaches are used to examine in depth the verbal and nonverbal revelations of human personality. Special fee. 4 cr. (Not offered every semester.)

450. History of Musical Theatre in America
Study of the development of the musical and its relationship to American social history. Special fee. 4 cr.

457. Introduction to Movement and Vocal Production
The purpose of this course is to learn vocal and physical/kinesthetic awareness, and be introduced to basic theories and lessons of Alexander and Feldenkrais and may combine Linklater and Lessac approaches. May be repeated to a total of 4 credits. Special fee. 2 cr.

458. Costume Construction
Study and development of costuming techniques, including hand and machine sewing, pattern drafting, alterations, and fabric manipulation. Emphasis on demonstrated understanding. Special fee. 4 cr.

459. Stagecraft
Elements of play production: basic building components, tools and materials for producing the scenery; equipment and shop layouts supporting all of the areas of the set, lighting, and costume designs; and consideration of various stage spaces and theatrical venues. Practical application on University theatre productions. Special fee. Lab. 4 cr.

#470. Movement and Vocal Production
The focus of this course is to expand the student's vocal and physical/kinesthetic awareness utilizing basic theories and lessons of Alexander and Feldenkrais. The student will combine Linklater and Lessac approaches for exploration. Special fee. May be repeated to a total of 8 credits. 2–4 cr.

475. Stage Makeup
Fundamentals of juvenile, old age, character, and special stage makeup techniques. Special fee. 2 cr.

520. Creative Drama
Drama techniques leading to the design and execution of drama sessions with children. Includes role-playing, improvisation, and story dramatization. Lab. 4 cr.

532. The London Experience
Exploration of the culture and history of London while enhancing study of live theatre prior to active study in the country. May be repeated to a maximum of 4 credits. Special fee. 2 cr. IA.

541. Arts and Theatre Administration
Administration practices applied to arts, music, and theatre management. Fund raising, public relations, business and box office management, audience development, and long-range planning. 4 cr.

546. Costume Design for the Theatre
How to design costumes for the theatre, not figure drawing, although drawing techniques are taught. Script analysis and research and presentational techniques for costume design explored and implemented. Special fee. 4 cr.

547. Stage Properties
Research and manufacture of period and modern stage, trim, and hand properties. Prereq: THDA 459. Special fee. 4 cr.

548. Stage Lighting Design and Execution
Script analysis, the light plot, and instrument schedule, including cue-writing, color, instrumentation, and the mechanics of developing a functional design. Special fee. 4 cr.

#550. The Actor's Voice through Text
Continuing development of the actor's techniques for creating increased vocal expressiveness. Addresses the methods of varying vocal style and presentation through in-depth analysis and interpretation of the text. Prereq: THDA 457. Special fee. 4 cr.

551. Acting I
Development of fundamental vocal and physical stage techniques for actors and directors through exercises, improvisation, and theatre games. Special fee. 4 cr.

552. Acting II
Application of prior training in acting to building characterizations in scenes and short plays. Prereq: THDA 551. Special fee. 4 cr.

555. Exploring Musical Theatre
Introduction to musical theatre as an American art form. Discussion and analyses of performing, acting, and staging techniques. Special fee. 4 cr.

583. Introduction to Puppetry
Introduces the art of puppetry for general appreciation, entertainment, application in the classroom, and as a therapeutic tool. Emphasis on constructing a variety of puppets (e.g., hand, rod, shadow, and scarf) and adapting literary sources for scripts and performance. (Not open to seniors.) Special fee. 4 cr.

#592A. Special Topics
Special topics, projects in theatre and dance. Content varies according to needs and interests of students and faculty. Course descriptions are available in department office. May be repeated for credit. 1–4 cr.

621. Education through Dramatization
Application to educational curricula of drama techniques including sensory awareness, movement, pantomime, storytelling, story dramatization. Includes lesson plan writing. Appropriate for both elementary and secondary education. 4 cr.

622. Storytelling, Story Theatre, and Involvement Dramatics
Students actively develop storytelling techniques based on individual needs. Includes an examination of story theatre and involvement styles and the development of the ensemble. 4 cr.

624. Theatre for Young Audiences
This broad spectrum theatre course touches on every aspect of dramatic production from historical overview through scripted play to final production. Emphasis is on dramatic theory as it applies to play writing, acting, directing, and production techniques as applied to a production for young audiences. Students are expected to actively participate in a culminating production experience to complete the learning experience. 4 cr.

627. Methods of Teaching Theatre
Laboratory course for students interested in teaching theatre, directing extra-curricular theatre programs and examining the approaches, materials, and techniques of theatre structure in combination with a teaching practicum. Prereq: permission. 2–4 cr.

632. The Interpretation of Shakespeare in the Theatre
Increases understanding of Shakespeare's language and action, and improves ability to speak his verse and prose with clarity and verve. Students achieve insights into Shakespeare's plays through the medium of performance. Weekly oral and written assignments. Prereq: two of the following three: THDA 457, 549, 551. 4 cr.

641. Stage Management
Introduction to the concepts and skills needed for stage management. Stage managers perform a central role in a theatrical production, coordinating artistic and technical elements. They need a thorough understanding of the script, strong management skills, and a solid background in all aspects of the theatre. Prepares students to function as a stage manager in productions at any theatre. Prereq: one of the following, THDA 459; 551; 597; 655; or 741. 2 cr.

650. Scene Painting for the Theatre
Scene painting analyzed. Techniques and media to create a larger-than-life approach to scale, equipment for conversion, and appropriate stylistic techniques for enlargement reviewed. Employs basic painting techniques and methods of paint application, but scale conversion techniques will extend the training of easel painters. Prereq: THDA 459. 2 cr.

651. Rendering for the Theatre
Theatrical rendering is a presentational arrangement of given items in perspective appropriate to a set or in a costume at a frozen moment during the production, indicating appropriate lighting, mood, atmosphere, and depth. For the theatre, this is generally done in watercolor, but many other media are possible and are explored. Prereq: THDA 459. 2 cr.

652. Scene Design
Scene design from script to finished design. Both aesthetic and practical viewpoints considered. Emphasis on presentational techniques: study of perspective and finished rendering. Prereq: THDA 459. Special fee. 4 cr.

653A. Performance Project
Application of prior coursework to a formal theatre production or to an individual performance or teaching project. Substantial written work is factored into the final grade. May be repeated. Writing intensive. 2 cr.

653B. Performance Project/Musical Theatre
Application of prior coursework to a formal theatre production or to an individual performance or teaching project related to Musical Theatre. Substantial written work is factored into the final grade. May be repeated. Special fee. 2 cr.

654. Scenic Arts Project
Application of prior coursework to a formal theatre production or to an individual performance or teaching project. Substantial written work is factored into the final grade. May be repeated. Writing intensive. 2 cr.

655. Musical Theatre Styles
Gives an increased understanding of performing and directing techniques as they apply to musical theatre. Students gain knowledge of various writers and historical periods, and they apply their knowledge to a variety of performance styles. Focus is on the discussion and application of auditioning, acting, and staging techniques. Special fee. Lab. Writing intensive. 4 cr.

657. Play Reading
A high-volume reading course which introduces a breadth of modern dramatic literature. American and British alternates annually with European and Russian, all from Brechner, Ibsen, Chekhov to the present. Students read 4–5 plays per week and view 1–2 plays on video or film. Lab. Special fee. 4 cr.

#683. Advanced Puppetry
In-depth study of the theory and practice of puppetry for the advanced student. Students develop skills in manipulation and construction of selected puppet forms and apply these skills in performance. Examines historical perspectives and the application of puppetry in the classroom and as a therapeutic tool. Prereq: THDA 583 or permission. 4 cr.

689. Theatre/Dance Practicum
The practicum ensures a breadth of experience in the major. Students should register for a different topic each semester during the sophomore and junior years. A) Technical, B) Costumes, C) Management, D) Performance. May be repeated for up to 6 credits. 1 cr. Cr/F.

691. Internship in Theatre and Dance
Fieldwork with a regional or touring theatre. This advanced level internship allows the student to experience a professional theatre setting prior to graduation. Normally supervised by a qualified theatre professional in the organization with frequent consultation with a faculty sponsor. A written report is required. May be part- or full-time with credits assigned accordingly. Prereq: second-semester junior or senior standing; permission. Student must also register for a graded 4-credit independent study. Variable credit up to 8 cr. Cr/F.

#729. Community-Oriented Drama Programs
Advanced practicum in designing, developing, and producing drama programs for the school and community. Includes audience analysis and marketing skills as well as adapting spaces, soliciting volunteers, and working with a limited budget. May be repeated to a maximum of 4 credits. 1–4 cr.

741. Directing
A process oriented approach to the art of stage directing. The course begins with an in-depth focus on script analysis. Students then develop their skills as the "master story teller" through imagination, interpretation, communication and style. Special fee. 4 cr.

742. Directing II
In-depth study of the theory and practice of stage direction for the advanced student. Builds on 741, Directing. Students strengthen and expand their existing knowledge of the subject area. Exploration focuses on three areas of directorial communication, application to periods and styles, and exploration of avant garde theory and directorial technique. Concludes with a major project mounted for public performance. Prereq: THDA 741. Special fee. 4 cr.

750. Writing for Performance
A) Play writing. Focus on original work with possible performances in other classes. Selected one-act plays will be eligible for entry into the Undergraduate Prize Productions performed in the spring semester. 4 cr. Special fee. (Not offered every year.)

755. Advanced Musical Theatre
Emphasis on characterizations and directing techniques. Use of scripts and scores of representative composers, lyricists, and librettists. Prereq: THDA 655. Special fee. Lab. 4 cr.

758. Acting III
An intensive review and expansion of the basics in Stanislavski's system, explores other dominant acting theories and techniques. Highly personalized approach, focusing on the classic playwrights of Early Realism, Modern Realism, and finally, addressing Non-realism/Avant Garde, Postmodernism, Expressionism, etc. Prereq: THDA 552. Special fee. 4 cr.

759. Acting: Period and Style
Introduction of the student actor to the techniques of style analysis and period research. For the first time in the students' undergraduate actor training, students will synthesize their basic actor training with the heightened language and archetypal characterization inherent in the classical theatre of the ancient Greeks, the Commedia d'Elle Arte, the Renaissance, the Neoclassical period, and the Restoration period. Prereq: THDA 457; 551, 552; one semester of 436 or 438 or permission. 4 cr.

#768. Chamber Theatre
Choric speaking, reader's theatre, chamber theatre, and other forms of group interpretation in theory and practice. Prereq: THDA 457. Special fee. 4 cr.

781. Theatre Workshop for Teachers
A) Puppetry; B) Storytelling; C) Directing the School Play; D) Makeup; E) Directing the School Musical; G) Basic Choreography for the School Musical; H) Script Adaptation; I) The Use of Drama to Enhance Reading and Writing; J) Set, Lighting, Costume Design and Construction Techniques; K) Accessible Shakespeare. Each of these intensive summer workshops for elementary, middle, and high school teachers focuses on developing both play production skills and methods of implementing theatre techniques in the classroom. Special fee. May be repeated. 2–4 cr. Special fee. (Offered summer semester.)

#782. Advanced Theatre Workshop for Teachers
A) Puppetry; B) Storytelling; C) Play Production for the Elementary and Middle School Teacher; D) Makeup; E) Performing the Musical with Elementary and Middle School Students; F) Play Production for the Middle School and High School Teacher; G) Basic Choreography for the School Musical; H) Script Adaptation; I) The Use of Drama to Enhance Reading and Writing; J) Set and Lighting: Design and Construction Techniques. Each of these advanced, intensive summer workshops for teachers focuses on expanding both play production skills and methods of implementing theatre techniques in the classroom. May be repeated. Special fee. 2–4 cr. (Offered summer semester.)

795, 796. Independent Study
Advanced individual study. Specific independent study opportunities are sometimes posted in the Theatre and Dance Department Office. Project, which includes a substantial piece of writing, must be developed with supervising instructor. May be repeated. Writing intensive. 1–8 cr.

798. Senior Seminar
Course consists of two parts. Part I is an exploration of avenues open and available to graduates in theatre and dance. Part II allows the students to focus on one area of interest and research, stemming from and expanding ideas coming out of Part I. This course culminates in a senior thesis. Theatre majors only. Prereq: senior status. 4 cr.

Tourism Planning and Development (TOUR)

Department of Resource Economics and Development
(For program description, see page 91.)

Chairperson: Alberto B. Manalo
Coordinator: Robert A. Robertson
Professors: John M. Halstead, Edmund F. Jansen, Jr., Bruce E. Lindsay
Associate Professors: Alberto B. Manalo, Robert A. Robertson
Assistant Professor: Dale Grenier
Extension Educator: Michael R. Sciabarrasi

400. Introduction to Tourism
Provides an informational foundation in tourism and gives a more extensive knowledge of the tourism industry. Examines historical perspectives, tourism organization, and supply and demand of the tourism industry. Discusses the dynamic and pluralistic nature of the tourism industry. Writing intensive. 4 cr.

439. Analyzing Community Systems
Examines key components, models, and data sources to provide an understanding of the forces that generate change within the community. The use of analytical tools to provide insight to the functioning of a community's economy and social system applied to towns and cities. Prereq: TOUR 400; EREC 411. 4 cr.

440. Tourism Attractions and Activities
Basic principles of planning, developing, and managing natural and manmade attractions. National, state, and local park systems, as well as private sector resorts, theme parks, and other tourist attractions are examined in view of their personal, economic, and social and environmental impacts. Prereq: Tour 400. 4 cr.

460. Professional Values and Ethics
Managers in public and private tourist organizations need to concern themselves with their obligations to employees, consumers, owners, and the society at large. This course involves the study of organizational values and ethics related to these complex human interactions in tourism professions, and the values and practices that should shape and improve them. Prereq: TOUR 400. 4 cr.

#500. Trend Analysis and Policy Development
The process of trend analysis as it relates to understanding the components of tourism policy development, implementation, analysis, and evaluation in the public and private sectors. Prereq: TOUR 400. 4 cr.

510. Tourism and Global Understanding
Introduction to ways in which tourism can act as a vehicle to understanding foreign cultures. Responsible tourism has the potential to help bridge cultural and psychological distances that separate people of different races, religions, and socio-economic classes. Through responsible tourism we can learn to appreciate, trust, and respect the human diversity that our world has to offer. It will help students gain an informed acquaintance with other cultures' beliefs, values, and customs and to understand the central role of tourism in international and cross-cultural understanding. Letter grading with Cr/F option. 4 cr.

550. Tourist Characteristics and Behavior
Study of the socioeconomic, demographic, and psychographic characteristics of various types of tourist populations; specific emphasis on host-guest relationships and human development. Prereq: TOUR 400. 4 cr.

560. Special Topics in Tourism
A) Heritage Tourism Planning; B) Rural Tourism Development. Prereq: TOUR 400. May be repeated. 4 cr.

615. Tourism Planning and Development
The planning and development of tourist resources and programs within a geographic region. Planning models are reviewed and analyzed. The relationship among tourists, tourist developments, and the planning of tourist attractions and services is examined. A strategic planning process is applied to the development of a regional tourism plan in New Hampshire. Prereq: TOUR 400. 4 cr.

633. Economics of Travel and Tourism
Provides an understanding of both the microeconomic and macroeconomic aspects of travel and tourism. Using economics as a theory base, the course attempts to identify what is significant or special about travel and tourism compared with other activities. Special attention is given to issues such as resource immobility, capacity constraints, seasonality, and consumers' inability to experience the product before purchase. Prereq: EREC 411. (Also offered as EREC 633.) 4 cr.

#640. Travel and Tourism Transportation Systems
Overview of the various transportation modes. Planning, financial, operational, marketing, and evaluation aspects of the different systems of transportation modes. Prereq: TOUR 400. 4 cr.

#660. Designing and Implementing Conferences and Meetings
Basic principles and theory of the planning and management of conferences and meetings. Use of

steering committees, selection of resource people, site selection, exhibits, and relations to supplier personnel. Special attention to designing the core of the conference and related activities. 4 cr.

700. Marketing Places
Concepts, tools, and techniques of services marketing with specific application to tourism attractions and facilities. Provides an understanding of market research, consumer attitudes and behavior, market segmentation, product pricing, and quality control. Differentiates between advertising, promotion, and public relations. Prereq: MKTG 550; TOUR 400. 4 cr.

705. Ecotourism: Managing for the Environment
Ecotourism embraces both the environment and economics. Provides a comprehensive framework for planning and managing ecotourism in order to both maximize potential benefits and to minimize potential costs for people and the environment. Seminar format. Case studies used to assess the role of ecotourism in the sustainable development of natural resources. Prereq: TOUR 400; juniors or seniors only. 4 cr.

#720. Domestic and International Destinations
A study of the geography of travel with emphasis on absolute and relative location destinations, and the cultural and physical features that distinguish them from other places. Prereq: TOUR 400. 4 cr.

767. Social Impact Assessment
Provides a cross-disciplinary perspective on the issues, problems, and methods of Social Impact Assessment (SIA). Provides analytic approach and theoretical framework for the assessment of diverse events, including changes in the natural environment, the local economy, or dominant technology. SIA is required of most U.S. and Canadian federal and state sponsored projects that come under the National Environmental Protection Act, as well as all projects funded by international donor agencies. (Juniors and seniors only.) Writing intensive. 4 cr.

792. International Experience
Travel to a foreign country for study of a specific topic to be approved by student's major adviser. Prereq: permission. 1–4 cr.

794. Tourism Internship
Fieldwork brings students in a full-time, 15-week (600 hours) supervised situation where they have an opportunity to achieve a synthesis, transfer, and application of the academic experience in a setting similar to that associated with professional employment. Prereq: permission. 4 cr.

798. Independent Study in Tourism
Special assignments in readings, investigations, field problems. May include teaching experience. Prereq: permission. 1–4 cr.

Water Resources Management (WARM)

Department of Natural Resources
(For program description, see page 92; for faculty listing, see page 191; see also course listings under Environmental Conservation, Forestry, Natural Resources, Soil Science, and Wildlife Management.)

500. Work Experience
Work in the field of water resources management; must be performed under professional supervision or approved by natural resources faculty. Students are responsible for arranging their own experience. The department assists students in locating acceptable internships. Prereq: WARM majors. May be repeated. 0 cr. Cr/F.

504. Freshwater Resources
Major determinants of freshwater resources including hydrologic cycle and water balance, precipitation, stream-flow measurement, pollution, water supply and sewage treatment, water resource management and regulation. Special fee. Lab/field trips. 4 cr.

603. Watershed Water Quality Management
Principles of land use as they relate to water quality and quantity. Lectures focus on biogeochemical cycles and the watershed approach to land and water resource management. Labs and field trips focus on methods of water sampling and analysis. One year of chemistry is recommended. Prereq: WARM 504 or permission. Special fee. Lab/field trips. 4 cr.

609, 610. Independent Study
Projects arranged according to student needs. May include teaching experience. Prereq: permission. 1–4 cr.

700. Critical Analysis of Water Resources Literature
Detailed consideration of current issues in water resource management in a seminar format. Emphasis on critical analysis of primary literature in environmental science relevant to water resources management. Special fee. Prereq: WARM 603. 2 cr.

711. Wetland Resource Management
Analysis of the natural resources of coastal and inland wetlands and environmental problems caused by human use and misuse of these ecosystems. Special fee. Prereq: BIOL 541, or WARM 603, or permission. 3 cr.

713. Field Wetland Ecology
Field investigation of coastal and inland wetland types. First half of course consists of field trips to visit and sample regional wetlands. Second half of course consists of methods used to analyze field samples from wetlands. Enrollment is limited. Prereq: present or past enrollment in WARM 711. Special fee. Lab/field trips. 3 cr.

716. Wetland Delineation
Examination of the soils, vegetation, and hydraulic functions of coastal and central New England wetlands. Students are responsible for the collection and identification of aquatic plant species, description of wetland soils, and delineation of wetland boundaries. Lectures and fieldwork. For juniors, seniors, and professionals. Prereq: permission. Special fee. 4 cr. (Offered summer session only.)

718. Wetland Evaluation
Lectures and field trips covering the theory and practice of wetland evaluation techniques with emphasis on the method for the comparative evaluation of nontidal wetlands in New Hampshire. Prereq: juniors, seniors, and working professionals. Field trips. Special fee. 2 cr. (Not offered every year.)

719. Wetlands Mitigation and Restoration
Assessing the problems of wetlands loss. Asks: what steps can be taken, does restoration work, can habitat value be replaced, and what constitutes equivalent mitigation? First half of course involves field trips to visit and sample mitigation and restoration sites. Second half focuses on student projects using the scientific method to address wetlands issues. Prereq: WARM 711 or permission. Special fee. Lab/field trips. 3 cr. (Not offered every year.)

721. Ecology of Polluted Waters
Impact of various water quality problems (e.g., excessive nutrient loading, organic matter loading, contamination by trace organic compounds) on the ecology of fresh waters, including microorganisms, aquatic invertebrates, algae, and fish. Design of impact assessment studies and data interpretation. Prereq: WARM 603 or BIOL 528 or BIOL 541; permission. Special fee. Lab/field trips. 4 cr.

795. Senior Thesis
Individual research guided by a program faculty member on a topic relevant to the student's area of specialization in the major. The research should employ skills and knowledge acquired by students during their tenure in the program and will result in a written thesis or scholarly publication. This course is open to all students in the program and is required for honors students. Prereq: permission. 4 cr.

Wildlife Management (WILD)

Department of Natural Resources
(For program description, see page 92; for faculty listing, see page 191; see also course listings under Environmental Conservation, Forestry, Natural Resources, Soil Science, and Water Resources Management.)

433. Wildlife Ecology
Historical, biological, ecological, and sociological factors affecting the wildlife resource and its management. Concepts in populations and their dynamics, communities, habitat, and management techniques. Special fee. Lab. 4 cr.

566. Wildlife Law Enforcement I
Fundamentals of wildlife law enforcement, its history, values, and the philosophy of managing people in the outdoors. Lab. 3 cr.

615. Wildlife Habitats
Introduction to animal-habitat associations, including an examination of spatial and temporal features of wildlife habitat, the evolution of habitat selection, and how habitat suitability/productivity is evaluated. Prereq: woody plant identification; limited to wildlife management majors and minors. Prereq: permission. Special fee. 4 cr.

636. Wildlife Techniques
Introduction to major behavioral, physical, and physiological characteristics of wild mammals and birds; application of field and laboratory techniques used to study these characteristics. Prereq: one course in general ecology and statistics. Weekend field trips required. Special fee. Writing intensive. 3 cr.

655. Vertebrate Biology
Introduction to systematics, behavior, physiology, and ecology of terrestrial vertebrates. Topics include reproductive systems, foraging strategies, and animal-habitat relationships. Some emphasis on New England species. Prereq: BIOL 411; 412; FOR 527 or equivalent. Special fee. Lab. 4 cr.

667. Wildlife Law Enforcement II
Techniques of wildlife law enforcement: dogs, computers, and other specific enforcement tactics. Hunter safety and conduct. Prereq: WILD 566 or permission. Lab. 3 cr.

695. Investigations in Wildlife Management
Topics may include wildlife energetics and physiology, habitat management, population dynamics, waterfowl management, fire ecology, wildlife management, captive wildlife care, landscapes and wildlife habitat, or teaching experience. Prereq: permission. 1–4 cr.

710. Endangered Species Seminar
This seminar provides students with an interactive class of student presentations and guest lectures by endangered species biologists. Emphasis is placed on biological, sociological, economic, and political factors that influence endangered species policy. The text provides case studies with emphasis on non-biological factors influencing policy. Students research the biological factors affecting endangered species and provide group presentations that explore the fundamentals of endangered species management. Special fee. 2 cr.

737. Wildlife Population Dynamics
Mechanisms that influence and characteristics of terrestrial wildlife populations. Prereq: One course in general ecology and statistics; senior major or permission of instructor. 3 cr.

738. Wildlife Policy and Management
Wildlife administration and policy. Local, regional, and national wildlife management strategies. Contemporary management issues of fragmentation, commercialization of wildlife, and wildlife professionalism. Prereq: senior majors only;/or permission. Special fee. Lab. Writing intensive. 4 cr.

739. Methods in Wildlife Demography and Conservation Biology
Introduction to estimators of abundance, survival estimates, life tables, and assessment of population viability. Prereq: concurrent or previous enrollment in a course on the concepts of population dynamics or conservation biology and one course in statistics. Prereq: permission. Special fee. 3 cr.

#772. Wildlife Energetics
Energy requirements of wildlife species and the manner in which these needs are met in their natural environment. Thermodynamics in ecological systems, factors influencing metabolic rate, food habits, food-use efficiency, food availability. Prereq: permission. Special fee. 2 cr.

799. Honors Senior Thesis
Working under the direction of a faculty sponsor, honor students conduct an independent research project. The student submits a research proposal, writes a final report in the format of a journal manuscript, and provides an oral presentation. Two semester sequence; grade of IA given at end of first semester. 2–4 cr. IA

Women's Studies (WS)

(For program description, see page 49; for minor program, see page 30.)

Coordinator, Women's Studies Program: Mara R. Witzling
Core Faculty: Kristine M. Baber, Family Studies; Linda M. Blum, Sociology; Marla A. Brettschneider, Political Science; Susan D. Franzosa, Education; Diane P. Freedman, English; Cinthia Gannett, English; Anita I. Garey, Sociology; Marc W. Herold, Economics; Jean E. Kennard, English; Barbara K. Larson, Anthropology; Nancy Lukens, Languages, Literatures, and Cultures; Janet L. Polasky, History; Mary E. Rhiel, Languages, Literatures, and Cultures; Juliette M. Rogers, Languages, Literatures, and Cultures; Susan Schibanoff, English; Raelene Shippee-Rice, Nursing; Barbara A. White, Women's Studies; Mara R. Witzling, Art and Art History; Jack A. Yeager, Languages, Literatures, and Cultures.

Professor: Barbara A. White
Assistant Professors: Linda M. Blum, Marla A. Brettschneider

401. Introduction to Women's Studies
Interdisciplinary survey of the major areas of women's studies; women's history, cross-cultural perspectives, women in literature, psychology of women, etc. Basic principles and concepts fundamental to more advanced women's studies research. Topics vary. Required for major and minor. Writing intensive. 4 cr.

595. Special Topics in Women's Studies
In-depth study of topics not covered in regular course offerings. Prereq: permission; WS 401. 1–4 cr.

632. Feminist Thought
Theories of women's oppression and emancipation explored from various historical, political, cultural, and social perspectives. A major goal of the course is to increase awareness of historical and contemporary feminist approaches to understanding women's experiences, representations, and relative positions in societies. The course also considers the interrelation of theory and practice and the impact of past feminist theories on feminist movements. Prereq: WS 401. 4 cr.

795. Independent Study
For advanced students who have the preparation to carry out an individual project of supervised research on a specific women's studies topic. Preparation should include WS 401 or equivalent, and/or other women's studies courses. Barring duplication of topic, may be repeated for a maximum of 8 cr. Prereq: permission of instructor and women's studies coordinator. 1–4 cr.

#796. Advanced Topics in Women's Studies
Advanced or specialized topics not normally covered in regular course offerings. May be repeated, but not in duplicate areas. Prereq: permission. 4 cr.

797. Internship
Students gain practical experience in a woman-focused agency or organization. Plan of study and requirements are developed together with a faculty adviser and the student's workplace advisor. Bimonthly seminar with all internship students and instructor. Prereq: permission. WS majors or minors. May be repeated. 4 cr.

798. Colloquium in Women's Studies
Intensive study of specialized topic for advanced students. Topics vary with instructor. Prereq: permission. Required for WS minors. Barring duplication of topic, may be repeated for credit. 1–4 cr.

799. Honors Thesis
With a faculty sponsor, students enrolled in the honors-in-major program develop an independent, investigative project in women's studies. Written thesis. Prereq: majors only; one other WS 700-level course prior to or concurrently with WS 799; permission. 4–8 cr.

World Literatures and Cultures in English (WLCE)

(For program description, see page 31.)

425F. Introduction to French Studies
Taught in English, this course is designed for students interested in exploring the history, literature, and culture of France and other French-speaking countries. Learning by means of guest speakers and multimedia. Prepares for FREN 401-402. Does not satisfy B.A. foreign language requirement, but does satisfy the general education requirement for foreign culture. Writing intensive. (Also listed as FREN 425.) Special fee. 4 cr. (Offered spring semesters and occasional summer semesters.)

425I. Introduction to Italian Studies
Designed for students interested in exploring Italian language and culture. Culture learning by means of guest speakers and visuals. Prepares for ITAL 401-402. Does not satisfy foreign-language proficiency requirement, but does satisfy the general education requirement for foreign culture. Writing intensive. (Also offered as ITAL 425.) Special fee. 4 cr. (Offered summers only. Not offered every summer.)

425J. Introduction to Japanese Culture and Civilization
Taught in English and designed for students interested in exploring the history, literature and culture of Japan. Strongly recommended for students of Japanese, Asian Studies and those considering study in Japan. Does not satisfy B.A. foreign language requirement, but does satisfy the general education requirement for foreign culture. (Also listed as JPN 425.) Special fee. 4 cr.

425R. Introduction to Russia: Contemporary Society and Culture
Introduction to contemporary Russian society and culture in English. Examines the "Russian mind" (as it was formed before 1917), the "Soviet mind," and how the two have clashed. A closer examination of how the Russians are adapting to the changes that have taken place in their country since the collapse of communism. Readings, films, realia. Themes to be discussed include leadership; authority and power; the Russian soul; family, women, youth, education, holidays and celebrations; the new Russians. (Also listed as RUSS 425.) Special fee. 4 cr.

500. Selected Topics in World Literature
Topics will be chosen which introduce students to major themes and genres. Writing intensive. (Also offered as CLAS 500, FREN 500, GERM 500, ITAL 500, PORT 500, RUSS 500, SPAN 500.) May be repeated for credit. 4 cr.

520G. Women in German Literature and Society (in translation)
A study of representative works by and about women in German society from the 18th century to the present. Texts discussed include fiction, fairy tales, autobiography, interviews, poetry, diaries, historical essays, and film, as well as selected critical works on the history of German feminism and feminist aesthetics. (Also listed as GERM 520.) Special fee. 4 cr.

521F. French Prose in Translation
Works affecting French thought from the Renaissance to the modern period. Readings, discussion, papers in English. Not for major credit. Writing intensive. (Also offered as FREN 621.) Special fee. 4 cr. (Not offered every year.)

521G. Major German Authors in English
Selected masterpieces of the 18th, 19th, and 20th centuries by authors such as Goethe, Heine, Mann, Kafka, Hesse, Bachmann, Koeppen, Brecht, Frisch, Wolf, and Dürrenmatt. Readings and discussions in English. May be taken for major credit. Can be used to fulfill gen ed Group 8: works of literature, philosophy, and ideas. (Also listed as GERM 521.) Special fee. 4 cr.

521I. Italian Literature in Translation, 13th–16th Centuries
Major works of fiction and nonfiction, reflecting ideas and taste during the first three centuries of Italian history. Readings, discussions, papers in English. No more than one course in English may be counted toward the minor. Writing intensive. (Also offered as ITAL 621.) Special fee. 4 cr. (Not offered every year.)

521R. Survey of 19th-Century Russian Literature in English
Selected masterpieces of 19th-century Russian literature. Pushkin, Gogol, Tolstoy, Dostoevsky, Chekhov, and others. Lectures and readings in English. Open to all students, including freshmen. Writing intensive. (Also listed as RUSS 521.) Special fee. 4 cr.

521S. Spanish and Portuguese Literature in Translation
Major works by principal authors, such as: Camões, Cervantes, Lope de Vega, Calderón, Eça de Queiroz, Unamuno, Ortega y Gasset, García Lorca, Casona, etc. Readings, discussions, papers in English. Does not count for Spanish major. (Also listed as SPAN 521.) Special fee. 4 cr.

#522F. French Drama in Translation
Major works of comedy, tragedy, and drama. Molière and Racine to the present day. Readings, discussions, papers in English. Not for major credit. (Also offered as FREN 622.) Special fee. 4 cr. (Not offered every year.)

522I. Italian Literature in Translation, 18th–20th Centuries
Major trends in post-Renaissance thought and culture in Italy. Readings, discussions, papers in English. No more than one course in English may be counted toward the Italian minor. Writing intensive. (Also offered as ITAL 622.) Special fee. 4 cr. (Not offered every year.) 4 cr.

522R. Survey of 20th-Century Russian Literature in English
Selected masterpieces of 20th-century Russian literature. Chekhov, Pasternak, Bely, Bulgakov, Solzhenitsyn, and others. Lectures and readings in English. Open to all students, including freshmen. Writing intensive. (Also listed as RUSS 522.) Special fee. 4 cr.

522S. Latin American and Brazilian Literature in Translation
Major works by principal authors, such as Inca Garcilaso, Díaz del Castillo, Machado de Assís, Borges, Asturias, Neruda, E. Veríssimo, Fuentes, Leñero, Guimarães Rosa, and Jorge Amado. Readings, discussion, papers in English. Does not count toward Spanish major. (Also listed as SPAN 522.) Special fee.

523G. Women and German Film
Acquaints students with major German film texts. Asks gender-specific questions about German film history, male and female film makers, the construction of sexuality through film images and narrative, and the impact of feminism on these. In English. Can be used to fulfill gen ed Group 5: foreign cultures. (Also listed at GERM 523.) Special fee. 4 cr.

524G. A Special Topic in German Film
Using analytical and critical tools, students read film texts as aesthetic works (with a form and a narrative) and as historical works (with a social function). Culminates in an investigation of a distinct historical period of German film or of a particular theme through the history of German film. (Also listed as GERM 524.) Special fee. 4 cr.

525F. Introduction to French Civilization
French civilization from a variety of perspectives and topics. Includes historical, geographical, and artistic expressions of French culture. Readings, discussion, and papers in English. Not for major credit. May be repeated for credit barring duplication of materials. Writing intensive. (Also listed as FREN 525.) Special fee. 4 cr. (Not offered every year.)

525G. Introduction to German Culture and Civilization
Aspects of the political, social, and cultural life of Germany, Austria, and Switzerland. Conducted in English. Required of German majors; strongly recommended for any students planning study abroad in a German-speaking country. (Also listed as GERM 525.) Special fee. 4 cr.

525S. Spanish Civilization and Culture
Historical, geographical, and artistic expressions of Spanish civilization that have formed the character of contemporary Spanish culture. Readings, slides, films, tapes, and records. Conducted in English. Majors must take either 525 or 526, but both may not be counted for major credit. (Also listed as SPAN 525.) Special fee. 4 cr.

526F. Introduction to Francophone Civilization
Focus on French-speaking cultures other than France. Includes historical, geographical, and artistic expressions of these cultures. Readings, discussion, and papers in English. Not for major credit. May be repeated for credit barring duplication of materials. Writing intensive. (Also listed as FREN 526.) Special fee. 4 cr. (Not offered every year.)

526S. Latin American Civilization and Culture
Significant historical, geographical, and artistic expressions of pre-Colombian and Latin American civilization. Readings, slides, films, tapes, records. Conducted in English. Majors must take either 525 or 526, but both may not be counted for major credit. (Also listed as SPAN 526.) Special fee. 4 cr.

593R. Major Russian Authors in English
In-depth discussion and analysis of major Russian authors or literary periods. A different author or period offered each semester. Lectures and readings in English. Open to all students. Not for major credit; majors must register for RUSS 693. Writing intensive. (Also listed as RUSS 593.) Special fee. 4 cr.

Zoology (ZOOL)

(For program description, see page 93.)

Chairperson: John J. Sasner
Professors: Ann C. Bucklin, John F. Burger, Donald S. Chandler, James F. Haney, Larry G. Harris, W. Huntting Howell, Thomas D. Kocher, John J. Sasner, James T. Taylor, Edward K. Tillinghast, Charles W. Walker, Winsor H. Watson III
Adjunct Professors: Arthur C. Borror, Miyoshi Ikawa, Philip J. Sawyer
Associate Professor: Michelle P. Scott
Research Associate Professor: Michael Lesser
Adjunct Associate Professor: John E. Foret
Assistant Professors: Jessica A. Bolker, Marianne Klauser Litvaitis
Research Assistant Professor: Karen L. Carleton
Adjunct Assistant Professors: David T. Bernstein, C. Sarah Cohen, Michele Dionne, Raymond E. Grizzle, Richard Langan, Barry J. Wicklow
Instructor: Mary Katherine Lockwood

401. Human Biology
Elementary study of the structure, function, and development of all systems of the body. No credit toward major or minor. Cannot be taken for credit after ZOOL 507-508. 4 cr.

#402. Environmental Biology
Basic interrelationships between organisms, populations, communities, and their environments; ecosystems; human modifications of natural environments and their consequences. No credit toward major or minor. Lab. 4 cr. (UNH at Manchester only.)

412. Principles of Zoology
Fundamentals of modern animal biology from cells to organisms, including anatomy, physiology, genetics, development, ecology, and the diversity produced by animal evolution. Weekly laboratory sessions provide a hands-on introduction to the animal kingdom. Special fee. Lab. 4 cr. (Spring semester only.)

#460. Biological Illustration
Scientific publishing and illustration including labeling, color techniques, and printing processes.

Illustration techniques include (1) pen and ink: wildlife illustrations; (2) carbon dust: half-tone illustrations; (3) colored pencil: drafting film; (4) watercolor: for accurate and detailed illustrations. The student may choose to explore a single technique in depth with subjects selected from a wide variety of material on Appledore Island. Course size is limited to allow individual attention. 2 cr. (Summers only at Shoals Marine Lab.)

#474. Introduction to Field Marine Science
Allows nonbiology majors to experience the breadth of the marine sciences under field conditions at an island (Appledore) laboratory, with excursions to seal and seabird colonies on neighboring islands and whale feeding grounds in the Gulf of Maine. Involves field investigation, lab work, and lectures as well as reading, independent research, and scientific writing. Topics include general marine biology, intertidal ecology, plankton biology, fisheries, and benthic (sea floor) communities. 4 cr. (Summers only at Shoals Marine Lab.)

503. Introduction to Marine Biology
Organization of marine biological communities in various marine environments—pelagic, benthic, temperate, tropical. Major emphasis on the approaches (e.g., analysis of energy flow and predator-prey interactions) used to analyze marine communities and on the sampling techniques employed for each approach and the habitat type. Prereq: BIOL 411-412. (Also offered as PBIO 503.) Lab. Special fee. 4 cr.

507-508. Human Anatomy and Physiology
Cellular and systematic aspects of the human body. Laboratory exercises utilize preserved specimens, dissectable models, living tissue and computer-aided instruction. Students may not receive credit for both ZOOL 507-508 and ZOOL 625. Not offered for credit to zoology majors. Special fee. Lab. 4 cr.

#510. Field Ornithology
An introduction to field ornithology focusing on the biology, ecology, and behavior of avifauna on the Isles of Shoals. Includes such ornithological field methods as censusing techniques, territory mapping, banding, behavioral observation, and creating a field notebook. Fieldwork is designed to supplement many classroom concepts, including territoriality, breeding biology, and survivorship. Prereq: one year of college-level biology. Lab. 4 cr. (Summers only at Shoals Marine Lab.)

515. Biomechanics
Introduction to the physical workings and properties of organisms and their environments. Basic physical concepts of forces, fluid mechanics, scaling, and materials structure are introduced in the context of organismal behavior and morphology. General topics include the physical properties of fluid environments, animal locomotion, the mechanical significance of size, and time-dependent mechanical properties of biological materials. Special topics relating to current research in the field. Emphasis on using physical concepts to gain insight into organismal functions, adaptations, and evolution. Prereq: BIOL 411 or ZOOL 412; BIOL 412 or PBIO 412;/or permission. Special fee. Lab. 4 cr.

516. Biophysics
Introduction to the physical basis of the biological world, covering concepts such as light and sound, electricity and magnetism, and heat and energy flow in the context of biological organisms. Topics include the physical basis of the five senses, the biological uses of color, electricity in organisms, animal thermal regulation, and practical applications of physical principles to biological experimentation. Complements ZOOL 515. Special fee. Lab. 4 cr.

518. Vertebrate Morphology
Evolutionary and comparative examination of vertebrate anatomy. Covers the structure of the major systems at both the macroscopic and the microscopic levels. Prereq: BIOL 411-412 or equivalent. Special fee. Lab. 5 cr.

530. Principles of Applied Entomology
Nature of destructive and beneficial insects and the fundamentals of insect pest management in our modern society. Introduction to the principal arthropod pests of New England associated with the major commodity groups, including structural ornamentals, and turf. Elective for sophomores, juniors, and seniors. Special fee. Lab. 4 cr. (Not offered every semester.)

542. Ornithology
Identification and biology of birds, especially those of northeastern United States. Involves field trips, laboratory work, and lectures. Prereq: one semester of biology. 4 cr. (Spring semester only.)

#560. Anatomy and Behavior of the Gull
Functional anatomy of all organ systems, with emphasis on the sensory, nervous, digestive, and respiratory systems. Large nesting colonies of two species of gulls on Appledore Island are used to demonstrate basic patterns of gull behavior. Involves daily lectures, lecture demonstrations, laboratory work, and fieldwork. Prereq: one course in college-level biology. 1 cr. Cr/F. (Summers only at Shoals Marine Lab.)

#570. Climates and Ecosystems
Practically oriented. Emphasizes (1) the definition description, and measurement of major abiotic factors (e.g., radiation, temperature, atmospheric moisture and precipitation, and winds and currents); (2) the role of both biotic and abiotic coastal environmental factors with respect to plants and animals including humans; (3) the fundamentals of dynamic meteorology and short-term weather prediction from observations of natural coastal phenomena such as cloud and wind patterns. Special attention is given to the terrestrial and littoral microclimate of Appledore Island. Prereq: one year of college-level biology; some physics or physical geography preferred. 4 cr. (Summers only at Shoals Marine Lab.)

600. Field Experience
A supervised experience providing the opportunity to apply academic experience in settings associated with future professional employment and/or related graduate opportunities. Must be approved by a faculty advisor selected by the student. May be repeated to a maximum of 8 credit hours. Pereq: permission. 1–4 cr. Cr/F.

625. Principles of Animal Physiology
Introduction to the principles of animal function. The major systems (digestion, metabolism, respiration, circulation, osmotic and ionic regulation, nerve-muscle function, endocrine control) are covered with emphasis on functional mechanisms at the cell and tissue levels. Students may not receive credit for both ZOOL 507-508 and ZOOL 625. Prereq: two years of the biology core curriculum. Lab. 3 cr.

626. Animal Physiology Laboratory
Basic training in the measurement of function in animals, data analysis and expression, and the development of scientific communications skills. Coreq: ZOOL 625. Special fee. 2 cr.

628. Marine Invertebrate Evolution and Ecology
Lecture and laboratory survey of invertebrate phyla; systematic morphology, phylogeny, and natural history. Prereq: BIOL 411-412. Special fee. Lab. 4 cr.

629. Developmental Biology of the Vertebrates
Principles of animal development, primarily in vertebrates, emphasizing the comparative approach and the integration of classical and molecular data. General topics include embryonic patterning, differentiation, morphogenesis, germ layers and their specific derivatives, environmental effects in development, and limb development. Special topics include maternal and embryonic adaptations, reproductive technology, and evolutionary perspectives on development. Prereq: ZOOL 518; ZOOL 625;/or permission. Special fee. Lab. Writing intensive. 4 cr.

#674. Field Marine Science
Introduction to the marine sciences with an emphasis on field work in natural habitats. Examines aspects of the systematics, morphology, physiology, behavior and ecology of marine organisms, including intertidal plants and invertebrates, fishes, marine mammals and birds; fisheries biology; oceanography, marine geology; and human impacts on the marine environment. Sessions include lectures, discussions, field work, experience aboard a coastal research vessel, and excursions to distinctive habitats. Offered in cooperation with Cornell University. Students may not take Field Marine Science after taking Field Marine Ecology. Prereq: one full year of college-level biology. 6 cr. (Summers only at Shoals Marine Lab.)

675. Field Marine Ecology
Introductory marine science course emphasizing field work in natural habitats with a focus on marine ecology. Examines the ecology of the intertidal zone and the ecological, evolutionary, and physiological adaptations of marine organisms. Course includes lectures; discussions; field work, including quantitative field sampling methods; experience aboard a coastal research vessel; and excursions to distinctive habitats. Offered in cooperation with Cornell University. Students may not take Field Marine Ecology after taking Field Marine Science. Prereq: One full year of college-level biology. 6 cr. (Summers only at Shoals Marine Lab.)

690. Evolution
Evolution is the change in properties of populations of organisms that transcends the lifetime of single individuals. Darwin's mechanism of evolution by natural selection accounts for the diverse adaptations of organisms to different environments. Topics include principles of heredity, sources and maintenance of variation, adaptation, speciation, levels of selection, and rates of evolution. Prereq: BIOL 411-412 or equivalent. 4 cr.

701. Conservation Biology
Critical and quantitative investigation of current issues in the conservation of biological systems. Is-

sues addressed include habitat restoration, nonindigenous species, harvest strategies, conserving genetic diversity, population viability anyalysis, global climate change, endangered species recovery, habitat fragmentation, and reserve design. Case studies include examples drawn from terrestrial, aquatic, and marine systems. Weekly laboratories include trips to local habitats of concern. Prereq: BIOL 541 or permission. A statistics course or familiarity with computers is highly recommended. Special fee. Lab. 4 cr. (Not offered every year.)

705. Population Genetics
An exploration of the forces affecting the frequency and distribution of allelic variation in natural populations. Emphasis on the relative roles of mutation, selection, random drift and inbreeding in structuring genetic variation and on the quantification of the genetic structure of populations. Prereq: BIOL 604. (Also offered as GEN 705.) Special fee. Lab. 4 cr. (Not offered every year.)

708. Stream Ecology
Ecological relationships of organisms in flowing water; streams as ecosystems. Lectures on physical and chemical features of streams, floral and faunal communities, and factors controlling populations of benthic invertebrates. Lab exercises employ both field and laboratory experimental techniques. Prereq: permission. Special fee. Lab. 4 cr. (Not offered every year.)

709. Environmental Physiology of Animals
Animal responses to natural changes or extremes of the physical environment. Emphasis on adaptation of animals to major environmental parameters such as nutrient levels, light, temperature, and ionic environment, as well as temporal (seasonal, daily) changes in these major environmental factors. Examples from several levels of organization including biofeedback mechanisms. Prereq: BIOL 541, ZOOL 625, or equivalent. 4 cr. (Not offered every year.)

710. Ichthyology
Introduction to the evolution, systematics, anatomy, physiology, and ecology of fishes, with emphasis on New England species. Prereq: principles of biology or equivalent. Lab. 4 cr. (Offered in alternate years.)

711. Zooplankton Ecology
Methods of sampling populations; factors regulating temporal and spatial distribution; trophic interactions of communities, role in nutrient cycle of lakes. Experimental techniques employed in field trips to freshwater habitats; seminars examine current research. Prereq: general ecology and limnology, ZOOL/PBIO 717, or equivalent; permission. Special fee. Lab. 4 cr. (Not offered every year.)

712. Mammalogy
Evolution, ecology, behavior, physiology, and diversity of mammals. Focuses on conceptual issues such as the relations of structure, function, physiology, and ecology of species; reproductive physiology and life history strategies; and the evolution of mating systems and social structure. Requires familiarity with mammalian groups to the family level and identification of local fauna to species. Prereq: BIOL 411-412 or equivalent. Lab. Writing intensive. 4 cr. (Not offered every year.)

713. Animal Behavior
Introduces the naturalistic study of animal behavior. Emphasizes the evolution, development, physiology, and ecology of behavior. Topics include the genetic and acquired bases of behavior; neuropathology and behavioral endocrinology; communication; orientation; foraging strategies; reproductive ecology; and the evolution of altruistic behavior. Prereq: BIOL 411-412 or equivalent. Lab. 4 cr.

#714. The Ecology of Animal Behavior
An animal's behavioral patterns represent its ability to deal with the environment dynamically. Course focuses on ecological and evolutionary significance of behavioral patterns found in all organisms, particularly those animals that inhabit coastal marine environments. Strong emphasis on methods of behavioral research and interpretation of behavioral patterns using field observations of diverse fauna of Appledore Island and surrounding waters. Prereq: introductory biology; experience in psychology, animal behavior, or ecology is helpful. 4 cr. (Summers only at Shoals Marine Lab.)

715. Molecular Evolution
Rates and patterns of evolutionary change in biomolecules; forces affecting the size and structure of genomes; molecular mechanisms of organismal evolution. Emphasis on integrating evidence from biochemistry, molecular genetics, and organismal studies as well as on methods of reconstructing phylogeny from molecular sequences. Prereq: BIOL 604. Some knowledge of statistics and familiarity with personal computers are recommended. (Also offered as GEN 715.) Special fee. Lab. 4 cr. (Not offered every year.)

716. Multivariate Statistics for Ecology
Methods of observation and inference in ecology; data reduction and exploratory analysis; detection of association, difference, and similarity using linear models and other multivariate approaches. Critiques of design and analysis of published studies. Prereq: formal coursework in statistics and ecology; permission. 4 cr.

717. General Limnology
Special relationships of freshwater organisms to the chemical, physical, and biological aspects of the aquatic environment. Factors regulating the distribution of organisms and primary and secondary productivity of lake habitats. Prereq: BIOL 541 or equivalent. (Also offered as PBIO 717.) 4 cr.

#718. Quantitative Aquatic Ecology
Aquatic ecosystems studied through field and laboratory exercises. Emphasis on the application of statistical methods to biological systems. Field trip data, collected from remote lakes in the White Mountain National Forest as well as from southern New Hampshire lakes, are analyzed in both biology and statistics laboratories. Prereq: BIOL 541 or equivalent. (Also offered as PBIO 718.) 6 cr. (Summers only, alternate years.)

719. Field Limnology
Ecology of inland waters examined through field studies of lakes, streams, and other freshwater habitats. Emphasizes methods for studying lakes, analysis and interpretation of data, and writing of scientific reports. Includes seminars on research papers and field trips to a variety of lakes from coastal plain to White Mountains. Prereq: Concurrent or prior enrollment in PBIO 717, ZOOL 717, or equivalent, and permission. (Also offered as PBIO 719.) Special fee. Lab. 4 cr.

#720. Marine Biology for Teachers
Primarily for teachers grades 6 through 12, but open to others. An overview of living marine organisms (algae, invertebrates, fishes, marine mammals, and shore birds) and their environment. Emphasizes fieldwork; students who are certified divers or who wish to learn snorkeling are encouraged to use these techniques. Includes at least one excursion on the lab's research vessel. Topics include coastal zone problems, marine fisheries, economics of marine organisms, and the educational resources of the marine environment. Participants are encouraged to register for an additional credit to research and prepare lesson plans and teaching material for class use. Prereq: introductory biology. 3 or 4 cr. (Summers only at Shoals Marine Lab.)

722. Ecology of Marine Fishes
Principles, models, and methods for analysis of dynamics of fish populations and communities; analysis of current research emphasizing theory and its potential uses in fisheries management; lab and field activities emphasizing collection and analysis of data from Gulf of Maine and adjacent estuarine habitats. Prereq: one year of college-level biology. Lab. 4 cr. (Summers only at Shoals Marine Lab.)

723. Quantitative Genetics
Analysis of continuous variation in populations simultaneously segregating at multiple loci; genetic and nongenetic factors and the complex interactions between them; models and methods of analysis, for both theoretical and practical applications. Prereq: BIOL 604. BIOL 528 is strongly suggested. Writing intensive. (Also offered as GEN 723.) Special fee. Lab. 4 cr. (Not offered every year.)

725. Marine Ecology
Marine environment and its biota, emphasizing intertidal and estuarine habitats. Includes fieldwork, laboratory work; and an independent research project. Prereq: general ecology; permission. Marine invertebrate zoology, oceanography, and statistics are desirable. (Also offered as PBIO 725.) 4 cr. (Not offered every year.)

726. Comparative Physiology
Laboratory modules designed to enable students to investigate nutrition, metabolism, neural function, reproduction and homeostatic mechanisms of animals, especially invertebrates. Emphasis on learning how to conduct effective physiological studies. Prereq: ZOOL 625 and 626 or equivalent; permission. Special fee. 1–4 cr. (Not offered every year.)

#727. Field Ecology of Amphibians and Reptiles
Origins, evolution, ecology, and conservation of amphibians and reptiles. Overnight field trips conducted throughout the state make use of photographic and other nondestructive sampling methods. Prereq: BIOL 411-412 or equivalent. Special fee. 4 cr. (Summers only.)

728. Comparative Systematics and Evolution of Invertebrates
A synthetic approach to invertebrate phylogenies based on critical examinations of morphological, embryological, and molecular characters. Considers methods of phylogenetic reconstruction, theories of metazoan origin, and phylogeny of major groups. Prereq: ZOOL 628 or equivalent. Lab. 4 cr. (Fall semester only, alternate years.)

#730. Underwater Research
Hypothesis testing and experimental design, theoretical and practical aspects of sampling, and critiques of current research papers. Includes special problems of conducting research underwater (diving physics and physiology, theory and use of diving tables, hyperbaric medicine) and underwater techniques (underwater photography and video, photo quadrats, tagging and marking, cages and enclosures). Students must supply their own equipment. Students with special research interests are encouraged to enroll in an additional third week of independent underwater research. Prereq: recognized scuba certification, a medical examination, one year of biology or other supporting science. 4 cr. (Summers only at Shoals Marine Lab.)

731. A Systems Approach to Biological Ocean Science
Broad survey of biological ocean science for advanced undergraduate and graduate students. Uses an interdisciplinary, "systems" approach to focus on major opportunities and challenges for ocean science in the future. Classes meet for one three-hour session each week and include lecture, discussion, demonstration, and laboratory sessions appropriate to the subject material with presentations by guest speakers. Focus of the course is different each time it is offered; topics have included temporal and spatial scales of variation, estuarine ecosystem dynamics. May be repeated for credit. Prereq: permission. (Also offered as EOS 731.) 3 cr.

733. Behavioral Ecology
Behavorial adaptations of animals to their environment including the evolution of behavior and behavioral genetics; foraging and competition for resources; reproductive ecology, mating systems and parental care; and the evolution of cooperative behavior. Examples include both vertebrates and invertebrates. Emphasis is on critical understanding of concepts as exhibited in oral and written exercises. Students conduct independent investigations. Prereq: ZOOL 713 or permission. Lab. Writing inensive. 4 cr. (Offered in alternate years.)

#740. Ciliophorology
Ciliophoran biology in depth. Lectures on the ciliate faunules in Chesapeake Bay salt marshes, sulfureta, and plankton, Sippiwissett, Chincoteaque, Bermuda, Florida Keys, Sapelo Island, Rye Beach and other sandy sediment interstitial psammobiotic habitats; the marine snow ciliates of the Gulf Stream and the Saragasso Sea; the marine cave ciliates of Bermuda; and the ciliates of the East Pacific Rim. Laboratory exercises; silver-staining techniques; back-scattered and secondary SEM and TEM; ciliate extraction, cultivation, and isolation. 2 cr. (Summers only at Shoals Marine Lab.)

750. Biological Oceanography
Biological processes of the oceans, including primary and secondary production, trophodynamics, plankton diversity, zooplankton feeding ecology, microbial ecology, and global ocean dynamics. Emphasis on experimental approaches. Term project involves either development of an ecosystem model or performance of a field experiment. Field trips on R/V *Gulf Challenger* and to the Jackson Estuarine Laboratory. Prereq: one year of biology or permission of instructor. (Also offered as ESCI 750.) Special fee. Lab. 4 cr. (Not offered every year.)

#751. Experimental Marine Ecology
Introduction to the adaptations of organisms to marine environments and the role these adaptations have in structuring marine communities using an experimental approach. Emphasis is on experimental design, implementation, data analysis and scientific presentations. Offered in cooperation with Cornell University. Prereq: one year of college-level biology. Additional experience in ecology or physiology is recommended. 6 cr. (Summers only at Shoals Marine Lab.)

#753. Marine Vertebrates
Lectures, laboratory work, and fieldwork on the systematics, ecology, and physiology of fishes, marine reptiles, marine birds, and marine mammals of the Gulf of Maine. Offered in cooperation with Cornell University. Prereq: field marine science or vertebrate biology. 6 cr. (Summers only at Shoals Marine Lab.)

772. Fisheries Biology
Principles of fisheries science, with emphasis on techniques used to assess the biological characteristics of exploited fish populations, and the use of such information for fisheries management. Prereq: ZOOL 710 or equivalent; permission. Lab. 4 cr. (Not offered every year.)

#775. Reproduction and Development of Marine Invertebrates
Cultivation, experimental and descriptive embryology, developmental energetics, substrate selection, metamorphosis, and ecological significance of reproductive patterns in major invertebrate groups. Prereq: ZOOL 674 (UNH), Biol Sci 364 (Cornell), or invertebrate zoology. Offered in cooperation with Cornell University. 6 cr. (Summers only at Shoals Marine Lab; not offered every year.)

777. Neurobiology and Behavior
Survey of fundamental concepts and recent discoveries in neurobiology. Topics include structure and function of neurons, development, cellular basis of behavior (sensory and motor systems), neuropharmacology, and neural plasticity (learning). Prereq: BIOL 411-412 or permission. Physiology (ZOOL 625) also desirable. 4 cr.

#778. Neuroscience Techniques
Techniques- and laboratory-oriented course designed for students of the behavioral and physiological sciences who wish to understand the basic electrophysiological properties of neurons and how they interact. Uses both invertebrate and vertebrate systems to illustrate principles of synaptic transmission, integration, sensory information processing, and the control of movement. Prereq: ZOOL 777 or equivalent. Lab. 4 cr. (Not offered every year.)

795, 796. Special Investigations in Zoology
Independent study in various areas including but not limited to animal behavior, developmental biology, ecology, endocrinology, evolution, ichthyology, genetics, history of biology, invertebrate biology, neurobiology and behavior, protozoology, teaching practices, underwater research, vertebrate biology, and biological techniques. Course sections for advanced work, individual or group seminar. May include reading, laboratory work, organized seminars, and conferences. Prereq: permission of department chairperson and staff concerned. 1–4 cr.

799. Senior Thesis
Working under the direction of a faculty sponsor, the student plans and carries out independent research resulting in a written thesis. Limited to students entering their senior year; required for students in the Honors Program. Prereq: permission. Two semester sequence. 4 cr. IA.

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UNHM Adjunct Assistant Professor: Peter Haebler
UNHM Instructors: Jack E. Hoza, Mary C. McGuire, Judith Reed

The following courses are normally offered only at the University of New Hampshire at Manchester. For more information, see page 112 or contact UNHM at French Hall, 220 Hackett Hill Rd., Manchester, NH 03102, phone (603) 668-0700; fax (603) 623-2745; TTD (603) 668-0918.

ADM 400. Introduction to Business
Introduces the study of business: examines the origins and development of American business, its place in a global economy, and its legal and ethical roles in modern society. Includes an overview of the functional areas of business such as finance, marketing, and organizational behavior. Designed for business majors as well as for students considering a major in business. 4 cr.

ADM 430. Introduction to Business Statistics
The use of statistical methods for managerial decision making. Emphasis is on understanding concepts, including inferences from sample data and model formulation, as aids in decision making. No credit for students who have received credit for BIOL 528; DS 420; EREC 525; HHS 540; MATH 644; PSYC 402; SOC 502. 4 cr.

ADM 532. Introduction to Financial Accounting
Fundamental concepts of accounting and their impact on the business world and society as a whole. Emphasis on the recording of economic transactions, and preparation and analysis of financial statements. No credit for students who have had ACFI 501, 502. 4 cr.

ADM 533. Introduction to Managerial Accounting
Emphasizes how organizational managers use accounting information to support their functions of planning, control, and decision making. Examples taken from corporations, small business, and not-

for-profit organizations. No credit for students who have received credit for ACFI 503. Prereq: ADM 532. 4 cr.

#ADM 547. Survey of Business Law
Overview of the law pertaining to business and business relationships including such areas as contract, agency, sales, partnership, negotiable instruments, and property. Case methods. Prereq: sophomore status or permission based on appropriate experience. Not equivalent to MGT 647-648, Business Law I & II. No credit toward any major at the Whittemore School. 4 cr.

Biology

BIOL 405. The Diversity of Life
Survey of ecology, evolution, genetics, and the diversity of life. Emphasis on basic biological principles. For nonbiological science majors. Lecture and lab. Cannot be taken for credit after completion of BIOL 411, 413, or equivalent. Special fee. Lab. 4 cr.

BIOL 406. The Human Organism
Survey of biological chemistry, molecular and cell biology, and major plant and animal systems. Emphasis on basic biological principles. For nonbiological science majors. Lecture and lab. Cannot be taken for credit after completion of BIOL 412, 414, or equivalent. Special fee. Lab. 4 cr.

BIOL 413. Principles of Biology I
Lecture and laboratory introduction to biological principles; cell structure, function, replication, energetics and transport mechanisms; physiological processes; Mendelian, molecular genetics, and gene technology. Required for students majoring in the life sciences. Cannot be taken for credit after BIOL 411 or equivalent. Special fee. Lab. 4 cr.

BIOL 414. Principles of Biology II
Lecture and laboratory survey of the five kingdoms of life; physiology of cells, tissues, organs, and organ systems; evolution; human impact on the biosphere. Required for students majoring in the life sciences. Cannot be taken for credit after BIOL 412 or equivalent. Special fee. Lab. 4 cr.

Computer Information Systems

CIS 411. Introduction to Computer Applications
Beginning course on computer technology, specifically microcomputer systems. Emphasis is on (1) using computers to manage information for personal and professional applications and (2) the impact of computer information technology on today's society. Software applications used include word processing, spreadsheets, database, and graphics. Independent lab activities are a major part of the course content. No prior computer experience is required. No credit if credit has been received for DCE 491; 492; CS 401. Special fee. 4 cr.

CIS 412. Microcomputers and Office Automation
Explores the modern automated office. Students investigate tools available for the office environment such as local area networks (LANs), telecommunications systems, and document management systems. Emphasis is placed on the worker's role in an automated office and socioeconomic trends that have affected the office environment. Students also gain advanced skills in software applications such as programming database applications and desktop publishing. Prereq: CIS 411 or permission. Special fee. 4 cr.

CIS 415. The Digital Computer
Survey of the modern digital computer including its construction, operation, capabilities, limitations, history, and social significance. Explores the role of programming and representing data in digital computers. Students use and develop activities using Hypercard authoring language. Special fee. 4 cr.

CIS 510. Computer Information Systems
Investigates the role and impact of computer applications on information systems in general and specifically as applied to business requirements. Surveys the components of an information system; explores information systems in areas such as manufacturing, medicine, education, and government; discusses the issues of computerizing information resources. Directs attention to information systems in business and identifies the need for and function of formal systems development methodologies. Students investigate the steps involved in transaction processing and develop a prototype of a business information system using a DBMS application. Special fee. Prereq: CIS 411, CS 406, CIS 415;/or permission. 4 cr.

CIS 515. Multimedia: Introduction and Applications
Examines the history and underlying theory behind computer integration of text, sound, video, and graphics. Topics include: hardware and software requirements, design criteria, analysis of current hypertext, and multimedia applications in education and business. Students gain practical experience in developing multimedia applications on the Macintosh platform. Special fee. 4 cr.

CIS 520. Database Management Concepts
Introduces students to the basic concepts of file and database organization. Special emphasis on understanding the steps involved in designing a database and using a relational model to define, search, report, and maintain a database. Discusses database security, integrity, and concurrency control. Also addresses the current trends in database development, such as distributed databases, natural language processing and expert systems, and object-oriented databases. Emphasis focused on the design and use of a relational model with practical experience using a DBMS application. Special fee. Prereq: CIS 411; CIS 420; CIS 415;/or permission. 4 cr.

CIS 542. Operating System Applications
Introduction to operating system concepts with relevant lab experiences. Operating systems for both micro- and mainframe computers; available utilities; the generation of batch files for operation of a LAN. Operating systems covered may include MS-DOS, UNIX, and VAX VMS. Special fee. Prereq: CIS 411; CS 406;/or permission. 4 cr.

599. Special Topics in Computer Information Systems
Topics covered will vary depending on contemporary computer topics, programmatic need, availability and expertise of faculty. Barring duplication of subject, may be repeated for credit. Special fee. 1–4 cr.

Economics

ECN 411. Introduction to Macroeconomic Principles
Studies how an economy functions. Develops measures and theories of economic performance to study such issues as unemployment, inflation, international trade and finance, and the level of national production. Examines government policies designed to correct for unemployment and inflation with close attention to the use of fiscal and monetary policies in the U.S. No credit for students who have received credit for ECON 401. 411W is writing intensive. 4 cr.

ECN 412. Introduction to Microeconomic Principles
Studies the behavior and interaction of fundamental decision-making units in an economy, especially consumers and business firms. Applies such economic principles as scarcity, supply and demand, and elasticity to a variety of social issues. Topics include the resource allocation problems of households and business firms, economic theories of social problems (such as crime, divorce, and discrimination), and the economic implications of government policies affecting the environment, the workplace, and industrial organization. No credit for students who have received credit for ECON 402. 412W is writing intensive. 4 cr.

ECN 540. Law and Economics
Study of various concepts, functions, and implications of law from an economic perspective. Topics include economic theories of property, contract, tort, crime and punishment; implications for resource allocation of laws related to product liability, taxation, work, education, housing, patents, and the environment are examined using tools of economic analysis. Prereq: ECON 402; ECN 412;/or permission of instructor. No credit toward any major at the Whittemore School. 4 cr.

Humanities

HUMA 411. Humanities I
Introduction to the humanities and Western culture through literature, history, philosophy, music, art, and architecture. Examination of selected historical periods from classical Greece through the Renaissance through readings, films, slides, and field trips. Special fee. 4 cr.

HUMA 412. Humanities II
Introduction to the humanities and Western culture through literature, history, philosophy, music, art, and architecture. Examination of selected historical periods from the Enlightenment to the present through the use of readings, films, slides, and field trips. Special fee. 4 cr.

HUMA 519. Humanities: Classical Greece
Examination of the culture of classical Greece through the history, drama, philosophy, and art of the period. Open to all students. Recommended for students in the humanities concentration. Special fee. 4 cr.

HUMA 520. The Age of Mozart
Introduction to the literature, political writings, and historical developments of the period 1756–1791, the years of Wolfgang Amadeus Mozart's life. Materials from different fields—music, literature, theatre, film, political theory, and philosophy—to explore the life and work of the composer

and the times in which he lived. Examines topics such as individualism, political revolution, the beginnings of romanticism, the revolution in science and technology, and changes in economics and economic theory in readings and appropriate video and audio materials. No background in classical music is needed. 4 cr.

HUMA 622. Studies of Freedom and Liberty
Principles of freedom and liberty that helped to form Western culture from the Renaissance to the present. Topics include concepts of human nature, theories of government and society. Readings include Machiavelli, Locke, Paine, Mill, Marx, Freud, Sartre, and Marcuse. 4 cr.

HUMA 625. Social Justice in America
Introduction to theories of social justice and examination of historical examples of the law, economy, society, and public policy affecting social justice from the Colonial period to the present. 4 cr.

HUMA 630. The Development of Early Christianity
Examines the emergence of Western Christianity. Explores primary literature relating to religious concepts and theological positions during the first centuries of the Church from the Pauline letters, through the period of Roman Emperor Constantine, culminating in the writings of Augustine, Bishop of Hippo. Considers both Christian and non-Christian texts and assesses the forces that helped to shape the fledgling religion. Gives special attention to social, political, and cultural influences. 4 cr.

HUMA 632. The Beginning and End of the World: Genesis and Revelation in Western Humanities
Genesis and Revelation examined for the biblical views of history and time in general and then an exploration of various interpretations of this material in Western thought. After a careful reading of the texts, students examine how themes in these biblical works have influenced art and architecture, literature, science, history, and culture. Advantageous for students in English, literature, history, and humanities as well as for individuals who want a nondoctrinal reading of selections from one of the most influential literary works in the West. Special fee. 4 cr.

HUMA 660. The Moral Dimensions of Economic Life
Interdisciplinary examination of the moral implications of economic decisions, practices, issues, and events from ancient and modern perspectives. Topics include morality of trade, interest, profit, entrepreneurship, corporate takeovers, poverty, and wealth. Materials include philosophical and religious works (Aristotle, St. Thomas Aquinas), drama (Shakespeare), art and literature (Andy Warhol, Theodore Dreiser, F. Scott Fitzgerald), economics and history (Adam Smith, Jacob Viner), and films (Werner Herzog). 4 cr.

HUMA 680. New England Culture: Roots and Branches
Interdisciplinary examination of the richness, variety, and significance of selective periods of New England culture using literature, history, art and photographic images, music, artifacts, and oral histories. Subjects include Native American lore, European American contributions to regional culture, New England's literary tradition and influence on American culture. 4 cr.

HUMA 795. Humanities: A Study of Creativity
A study of human creativity through representative lives and works of such figures as daVinci, Einstein, Kathë Kollwitz, Bach, Dickens, and Freud. Lectures, class discussions, films, and slides supplemented by gallery tours, plays, and concerts. Open to students with a background in humanities or by permission of the instructor. Special fee. 4 cr. (Normally offered every other year.)

HUMA 796. Humanities: A Study of Contemporary Issues
Current social and political issues with focus on recent developments in public policy, science, and business, and their impact on social values. Prereq: junior status or permission. 4 cr. (Normally offered every other year.)

Independent Study

UMIS 599. Independent Study
Independent study with the approval and sponsorship of UNHM faculty of material not covered in regular course offerings. Barring duplication of subject, may be repeated for credit up to a maximum of 8 cr. 1–4 cr.

Sign Language Interpretation

INTR 430. Introduction to Interpretation
A survey of traditional and contemporary perspectives on interpretation and interpreters; introduces the cognitive processes involved in interpretation and factors that influence those processes. Several models of interpretation explored. Particular attention given to interpretation as an intercultural, as well as interlingual, process. Students engage in a research project related to course content. 4 cr.

ASL 435. American Sign Language I
Introduction to American Sign Language with emphasis on visual receptive and expressive skills using mime, gesture, facial expression, and ASL grammatical constructions and linguistics. Participants develop their skills through videotapes, classroom participation, and readings that cover issues important to the deaf community. Limited to 15 students. Special fee. No credit if credit has been received for COMM 533. 4 cr.

ASL 436. American Sign Language II
Continuation of ASL 435 and expansion on concepts and principles. Focus on more advanced vocabulary and patterns of grammar; use of space and modulation of signs to denote aspects of time and location; and additional information on deaf culture. Prereq: ASL 435 or program evaluation. Limited to 15 students. No credit if credit has been received for COMM 733. 4 cr.

INTR 438. A Sociocultural Perspective on the Deaf Community
Introduction to the deaf community and deaf culture. Discussion of similarities to, and differences from, mainstream hearing culture. Supplemental videotapes focus on aspects of the culture including deaf education, autobiographical sketches, deaf norms and values, and deaf literature and folklore. Theoretical issues of culture and linguistics applied to deaf culture, American Sign Language, and the variety of cultural perspectives of the deaf community. Students engage in a research project related to course content. Pre- or coreq: ENGL 401. 4 cr.

INTR 439. Ethics and Professional Standards for Interpreters
Seminar course using readings, theory, and discussion of hypothetical situations and role plays to explore ethical standards and dilemmas in ASL-English interpretation. Covers personal and professional values, ethics, and morality; professional principles; power, responsibility, and group dynamics; the interpreter's role; cross-cultural issues; and the decision-making process. Students engage in a research project related to course content. Prereq: INTR 430. Writing intensive. 4 cr.

ASL 530. American Sign Language Lab
Opportunity to focus on enrichment activities in an ASL language lab. Class is conducted entirely in ASL; instructors provide continual evaluation of and feedback on language skills. Prereq: ASL 435 and 436 or program evaluation. 2 cr.

ASL 531. American Sign Language III
Continuation of ASL 436. Expands on the groundwork and grammatical principles established in ASL I and II. Introduces the sociolinguistic aspects of ASL as it functions within the deaf cultural context. Limited to 15 students. Prereq: ASL 436 or program evaluation. 4 cr.

ASL 532. American Sign Language IV
Continuation of ASL 531. Expands on the groundwork and grammatical principles established in ASL I, II, and III. Introduces the sociolinguistic aspects of ASL as it functions within the deaf cultural context. Areas of investigation include use of formal versus informal sign register; sign variation by region, age, and gender; social factors that give rise to code switching; and political and cultural evolution of the U.S. deaf community. Taught in the target language using the direct experience method. Prereq: ASL 531 or program evaluation. Limited to 15 students. 4 cr.

INTR 539. Comparative Linguistic Analysis for Interpreters
Examines the basic similarities and differences between the linguistic structure of American Sign Language and spoken English; focuses on each language's communication functions and how they serve those functions. Students engage in a research project related to course content. Prereq: ENGL 505; pre- or coreq: ASL 532. 4 cr.

INTR 540. Principles and Practices of Translation
Introduction to theory and practice of translation. Students analyze preprepared interpretations and translations to discover how expert interpreters produce target language messages which are pragmatically equivalent to the source language messages. Particular attention paid to the form/meaning distinction. Students prepare translations from texts of their choosing. Pre- or coreq: ASL 532. 4 cr.

ASL 621. Advanced ASL Discourse for Interpreters
Focuses on the use of ASL discourse in formal as well as informal settings. Students explore the genres of public speaking, artistic expression, formal discussion, interview, and narrative. Development of ASL vocabulary in specialized areas not covered in previous courses. Prereq: ASL 532. 4 cr.

INTR 630. Principles and Practices of Consecutive Interpretation
Introduction to the theory and practice of consecutive interpretation. Analyzes and integrates specific subtasks of the interpreting process culminating in the performance of prepared and spontaneous consecutive interpretations. Students work with a variety of texts, language models, and settings with the goal of producing a grammatically correct target language text which is equivalent to the source language text. Prereq: INTR 540. 4 cr.

INTR 636. Principles of Simultaneous Interpretation
Introduces the theory and practice of simultaneous interpretation. Particular attention is given to processes involved in transition from consecutive to simultaneous interpreting. The advantages and limitations of both types of interpreting are compared. Students apply theoretical information to the process of simultaneous interpreting. Students engage in a research project related to course content. Prereq: INTR 630. 4 cr.

INTR 658. Deaf/Hearing Cultural Dynamics
Deaf culture and mainstream American culture compared, contrasted, and analyzed from a variety of perspectives. Cultural interactions between deaf and hearing people examined, and students explore potential cultural conflicts between deaf and hearing people. Students engage in a research project related to course content. Prereq: INTR 438 and ASL 532. Special fee. 4 cr.

INTR 732. Simultaneous Interpretation of Discussions, Speeches, and Reports
Focuses on the simultaneous interpretation of group discussions, speeches, and reports. Students apply theory learned in INTR 636 to a variety of texts, language models, and settings. Students engage in a research project related to course content. Prereq: INTR 636. Writing intensive. 4 cr.

INTR 734. Field Experience and Seminar I
Gives students the opportunity to observe professional working interpreters, with some direct interpreting experience as deemed appropriate. Students integrate knowledge, theoretical understanding, and skills acquired in the interpreting program by working closely with on-site supervisors (interpreters) in addition to attending a weekly seminar with the UNHM field experience coordinator. Pre- or coreq: INTR 732. 4 cr.

INTR 735. Field Experience and Seminar II
Gives students the opportunity to gain supervised interpreting experience. Students engage in actual interpreting assignments and receive support and mentorship from a professional interpreter, enabling them to integrate knowledge, theoretical understanding, and skills acquired in the interpreting program. Students work closely with on-site supervisors (interpreters) in addition to attending a biweekly seminar with the UNHM field coordinator. Prereq: INTR 734. 4 cr.

INTR 744. Principles and Practices of Transliteration
Introduces the theory and practice of transliteration. Students analyze preprepared transliterations to discover how expert transliterators produce semantically correct messages in signed and spoken English which are equivalent to the source texts. They will then produce transliterations which are semantically and pragmatically equivalent to the source texts. Students engage in a research project related to course content. Prereq: INTR 636. 4 cr.

INTR 798. Special Topics
Selected topics that vary by semester. Possible course topics are interpreting in educational settings, working with specific populations, or other topics of importance to interpretation. Descriptions available in departmental office during preregistration. Students engage in a research project related to course credit. Prereq: INTR 636; permission. May be repeated for credit if topics differ. 4 cr.

Special Topics

UMST 500. Internship
The UNHM internship places students in a variety of business and organizational settings under the direction of a faculty adviser and workplace supervisor. Students fulfill the obligations of the workplace internship plan, as well as complete individually-designed projects of academic merit under the direction of UNH faculty. Open to matriculated students with a 2.5 GPA or better. Students must receive approval of the UNHM internship coordinator. May be taken from 1–4 elective credits per semester, to a maximum of 8 credits. Cr/F.

UMST 599. Special Topics
Occasional offerings dependent on availability and interest of faculty. Barring duplication of subject, may be repeated for credit. 1–4 cr.

In addition to the above courses, the following courses are regularly offered at the University of New Hampshire at Manchester. Descriptions of these courses can be found in the department listings elsewhere in this catalog.

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John F. Weeks, Jr., B.S.
Concord, N.H. (1992–2000)

Donald P. Wharton, Ph.D.
President, Plymouth State College
Plymouth, N.H. (ex officio)

Stanley J. Yarosewick, Ph.D.
President, Keene State College
Keene, N.H. (ex officio)

University Administration

President
Joan R. Leitzel, Ph.D.

Provost and Vice President for Academic Affairs
Walter F. Eggers, Ph.D.

Vice President for Research and Public Service
Donald C. Sundberg, Ph.D.

Vice President for Finance and Administration
Candace R. Corvey, M.B.A.

Vice President for Student Affairs
Leila V. Moore, Ed.D.

Academic Units

Dean of the College of Liberal Arts
Marilyn Hoskin, Ph.D.

Dean of the College of Engineering and Physical Sciences
Roy B. Torbert, Ph.D.

Dean of the School of Health and Human Services
Raymond T. Coward, Ph.D.

Dean of the College of Life Sciences and Agriculture
William W. Mautz, Ph.D.

Interim Dean of the Whittemore School of Business and Economics
Michael J. Merenda, Ph.D.

Dean of the University of New Hampshire at Manchester
Karol A. LaCroix, Ph.D.

Dean of the Division of Continuing Education and Summer Session
William F. Murphy, Ed.D.

Dean of the Graduate School
Bruce L. Mallory, Ph.D.

Dean and Director of Cooperative Extension
John E. Pike, Ph.D.

Director of the Thompson School of Applied Science
Regina Smick-Attisano, Ed.D.

University Librarian
Claudia J. Morner, Ph.D.

(Current as of February, 1999.)

(This list is current as of January 1, 1999. The date of appointment appears in parentheses following the faculty member's name.)

†**Aber, John D.** (1987)
Professor of Natural Resources and Earth, Oceans, and Space and Complex Systems Research Center; B.S., Yale University, 1971; M.F.S., Yale School of Forestry, 1973; Ph.D., Yale University, 1976.

Abrams, Eleanor D. (1994)
Assistant Professor of Education; B.S., University of Massachusetts at Amherst, 1983; Ph.D., Louisiana State University, 1993.

Afolayan, Funso (1996)
Assistant Professor of History; B.A., University of Ife, Nigeria, 1980; M.A., Obafemi Awolowo University, Nigeria, 1984; Ph.D., ibid., 1991.

Aikins, Janet (1979)
Professor of English; B.A., Grinnell College, 1972; M.S., University of Chicago, 1973; Ph.D., ibid., 1980.

Aldrich, Linda (1991)
Assistant Professor of Recreation Management and Policy; B.S., University of New Hampshire, 1984; M.Ed., Boston University, 1986.

Amato-Wierda, Carmela C. (1995)
Fellow, Dean's Office, Materials Science; B.A., Harvard University, 1988; Ph.D., Rensselaer Polytechnic Institute, 1993.

Anderson, Franz E. (1967)
Professor of Geology; B.A., Ohio Wesleyan University, 1960; M.A., Northwestern University, 1962; Ph.D., University of Washington, 1967.

Anderson, William F. (1998)
Lieutenant Colonel, U.S. Army and Professor of Military Science; B.S., United States Military Academy, 1981; M.S., Air Force Institute of Technology, 1991.

Andrew, David S. (1976)
Professor of Art History and the Humanities; B.A., University of Michigan at Ann Arbor, 1965; M.A., ibid., 1968; Ph.D., Washington University, 1977.

Andrew, Michael D. (1966)
Professor of Education; B.S., Cornell University, 1960; A.M.T., Harvard University, 1961; Ed.D., ibid., 1969.

Annicchiarico, Michael J. (1991)
Assistant Professor of Music; B.M., University of New Hampshire, 1976; M.F.A., Brandeis University, 1981; Ph.D., ibid., 1993.

Appel, Kenneth I. (1993)
Professor of Mathematics; B.S., Queens College, 1953; M.A., University of Michigan at Ann Arbor, 1956; Ph.D., ibid., 1959.

Archer, John M. (1996)
Associate Professor of English; B.A., University of Toronto, Canada, 1982; M.A., ibid., 1983; Ph.D., Princeton University, 1988.

Arnoldy, Roger L. (1967)
Director, Space Science Center and Professor of Physics and Earth, Oceans, and Space; B.S., St. Mary's College, 1956; M.S., University of Minnesota, 1959; Ph.D., ibid., 1962.

Ashwell, Thomas W. (1998)
Assistant Professor of Kinesiology; B.A., University of Massachusetts at Amherst, 1988; M.A., ibid., 1989; Ph.D., ibid., 1994.

Awe, Jaime J. (1997)
Faculty-in-Residence, Assistant Professor in Anthropology; B.A., Trent University, 1981; M.A., ibid., 1985; Ph.D., University of London, England, 1992.

†**Babbitt, Kimberly J.** (1996)
Assistant Professor of Wildlife Ecology; B.S., University of New Hampshire, 1984; M.S., Texas A & M University, 1988; Ph.D., University of Florida, 1996.

Baber, Kristine M. (1984)
Associate Professor of Family Studies; B.A., Southern Illinois University at Carbondale, 1970; M.A., University of Connecticut, 1981; Ph.D., ibid., 1983.

Bacon, Charlotte M. (1998)
Assistant Professor of English; B.A., Harvard University, 1988; M.F.A., Columbia University, 1994.

Bailey, Brigitte Gabcke (1987)
Associate Professor of English; B.A., University of Virginia, 1977; A.M., Harvard University, 1980; Ph.D., ibid., 1985.

Baker, Alan L. (1972)
Associate Professor of Plant Biology; B.A., State University of New York at Binghamton, 1965; Ph.D., University of Minnesota, 1973.

Balderacchi, Arthur E. (1965)
Professor of Art; A.B., Duke University, 1960; M.F.A., University of Georgia, 1965.

Baldwin, Kenneth C. (1982)
Associate Professor of Mechanical Engineering and Ocean Engineering and Director, Center for Ocean Engineering; B.S.M.E., Northeastern University, 1973; M.S.M.E., University of New Hampshire, 1977; Ph.D., University of Rhode Island, 1982.

Ballestero, Thomas P. (1983)
Associate Professor of Civil Engineering and Director, Water Resources Research Center; B.S.C.E., Pennsylvania State University, 1975; M.S.C.E., ibid., 1977; Ph.D., Colorado State University, 1981.

Balling, L. Christian (1967)
Professor of Physics; B.A., Oberlin College, 1960; M.A., Harvard University, 1961; Ph.D., ibid., 1965.

Banach, Mary (1995)
Assistant Professor of Social Work; B.A., University of Wisconsin at Milwaukee, 1975; M.S.W., New York University, 1978; D.S.W., Columbia University, 1995.

Banyard, Victoria L. (1995)
Assistant Professor of Psychology; B.A., Brown University, 1988; M.A., University of Michigan at Ann Arbor, 1990; Ph.D., ibid., 1994.

Barber, Heather (1993)
Associate Professor of Kinesiology; B.S., St. Lawrence University, 1978; M.S., Pennsylvania State University, 1982; Ph.D., University of Oregon, 1992.

Barkey, Dale P. (1987)
Associate Professor of Chemical Engineering; B.A., Clark University, 1979; M.S., University of Cincinnati, 1982; Ph.D., University of California at Berkeley, 1987.

Barnett, Carole K. (1994)
Assistant Professor of Management; B.A., University of Michigan at Ann Arbor, 1989; M.A., ibid., 1992; Ph.D., ibid., 1994.

Barney, Dwight E. (1971)
Thompson School Associate Professor of Applied Animal Science; B.S., University of New Hampshire, 1966; M.S., ibid., 1971.

Barretto, Timothy E. (1986)
Thompson School Associate Professor of Communications; B.A., University of New Hampshire, 1974; M.A., ibid., 1982.

Barstow, Thomas R. (1965)
Assistant Professor of Kinesiology; B.S., St. Lawrence University, 1961; M.Ed., ibid., 1965.

Bartos, Radim (1997)
Assistant Professor of Computer Science; M.S., Czech Technical University, 1987; M.S., University of Denver, 1996; Ph.D., ibid., 1997.

Bauer, Christopher F. (1981)
Professor of Chemistry; B.S., University of Notre Dame, 1974; M.S., University of Illinois at Urbana-Champaign, 1976; Ph.D., Colorado State University, 1979.

Bean, Christine L. (1990)
Assistant Professor of Medical Laboratory Science; B.S., University of New Hampshire, 1982; M.B.A., New Hampshire College, 1993.

‡**Beauregard, John N.** (1996)
Faculty-in-Residence, Assistant Professor in Chemistry; B.A., Assumption College, 1986; Ph.D., University of New Hampshire, 1992.

†**Becker, Mimi Larsen** (1993)
Assistant Professor of Natural Resources and Environmental Policy; B.A., Carleton College, 1957; M.A., Duke University, 1989; Ph.D., ibid., 1993.

Bedker, Patricia D. (1985)
Associate Dean of the College of Life Sciences and Agriculture and Associate Professor of Animal Science and Adult Education; B.S., University of Massachusetts at Amherst, 1974; M.S., University of New Hampshire, 1980; Ph.D., Cornell University, 1985.

Bellamy, Elizabeth Jane (1993)
Associate Professor of English; B.A., Goucher College, 1972; M.A., Duke University, 1973; Ph.D., ibid., 1982.

Beller-McKenna, Daniel (1998)
Assistant Professor of Music; B.A., Temple University, 1985; M.M., ibid., 1988; M.A., Harvard University, 1991; Ph.D., ibid., 1994.

Bellinger, Christina (1991)
Associate Professor, Librarian; B.A., Windham College, 1975; M.S., Simmons College, 1978.

Benassi, Victor A. (1982)
Interim Associate Vice President for Academic Affairs and Professor of Psychology; B.S., California State College, 1969; M.A., Queens College, 1973; Ph.D., City College of New York, 1974.

Bennett, Albert B., Jr. (1967)
Professor of Mathematics; B.S., Maine Maritime Academy, 1954; B.S., University of Maine at Orono, 1958; M.A., ibid., 1959; Ed.D., University of Michigan at Ann Arbor, 1966.

Benoit, Jean (1983)
Professor of Civil Engineering; B.S., Ecole Polytechnique, University of Montreal, 1977; M.S., Stanford University, 1980; Ph.D., ibid., 1983.

Bérenguier, Nadine S. (1995)
Assistant Professor of French; D.E.U.G., Université De La Sorbonne, France, 1976; Licence, ibid., 1980; M.A., University of Pittsburgh, 1983; Ph.D., Stanford University, 1988.

Bergeron, Linda Rene (1997)
Assistant Professor of Social Work; B.A., University of New Hampshire, 1973; M.S.W., University of Connecticut, 1981.

Bergeron, R. Daniel (1974)
Professor of Computer Science; Sc.B., Brown University, 1966; Ph.D., ibid., 1973.

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*Indicates time devoted to Cooperative Extension.
†Indicates time devoted to Agricultural Experiment Station.
‡Indicates part-time status (88–99 percent time).

*†**Berndtson, William E.** (1979)
Professor of Animal Science; B.S., University of Connecticut, 1966; Ph.D., Cornell University, 1971.

Bernhard, Jennifer T. (1995)
Assistant Professor of Electrical Engineering; B.S., Cornell University, 1988; M.S., Duke University, 1990; Ph.D., ibid., 1994.

Berntson, Glenn M. (1998)
Research Assistant Professor of Earth, Oceans, and Space; B.A., Swarthmore College, 1989; M.Phil., Cambridge University, England, 1990; Ph.D., Harvard University, 1996.

Birch, Francis S. (1972)
Professor of Earth Sciences; A.B., Harvard University, 1958; M.S., University of Wisconsin at Madison, 1964; Ph.D., Princeton University, 1969.

Birch, Thomas D. (1987)
UNHM Associate Professor of Economics; B.A., Kenyon College, 1977; M.A., Indiana University at Bloomington, 1980; Ph.D., ibid., 1983.

Black, Kelly J. (1994)
Assistant Professor of Mathematics; B.S., Rose-Hulman Institute of Technology, 1987; Sc.M., Brown University, 1989; Ph.D., ibid., 1992.

Blakemore, Richard P. (1977)
Professor of Microbiology; B.S., State University of New York at Albany, 1964; M.S., ibid., 1965; Ph.D., University of Massachusetts at Amherst, 1975.

*†**Blanchard, Robert O.** (1972)
Professor of Plant Biology; B.S., University of Southern Maine, 1964; M.Ed., University of Georgia, 1969; Ph.D., ibid., 1971.

Blum, Linda M. (1996)
Assistant Professor of Sociology and Women's Studies; B.A., University of California at Los Angeles, 1978; M.A., University of California at Berkeley, 1980; Ph.D., ibid., 1987.

Bobick, Melvin T. (1958)
Professor of Sociology; A.B., University of Illinois at Urbana-Champaign, 1949; A.M., ibid., 1952; Ph.D., ibid., 1958.

†**Bobilya, Dennis J.** (1991)
Associate Professor of Nutritional Sciences; B.S., Purdue University, 1982; M.S., Michigan State University, 1985; Ph.D., University of Missouri, 1989.

‡**Bochert, Mark L.** (1997)
Instructor of Computer Science; B.A., University of Southern Maine, 1986; Ph.D., University of New Hampshire, 1995.

Bolian, Charles E. (1971)
Associate Professor of Anthropology; B.A., Mississippi State University, 1965; Ph.D., University of Illinois at Urbana-Champaign, 1975.

†**Bolker, Jessica A.** (1997)
Assistant Professor of Zoology; B.S., Yale University, 1986; Ph.D., University of California at Berkeley, 1993.

Bolster, W. Jeffrey (1991)
Associate Professor of History; B.A., Trinity College, 1976; M.A., Brown University, 1984; Ph.D., Johns Hopkins University, 1991.

Bornstein, Steven P. (1989)
Associate Professor of Communication Disorders and Director of Audiology Clinic; B.S., Northeastern University, 1975; M.Ed., ibid., 1977; Ph.D., University of Connecticut, 1981.

Bothner, Wallace A. (1967)
Professor of Geology; B.A., State University of New York at Binghamton, 1963; Ph.D., University of Wyoming, 1967.

†**Boulton, Elizabeth P.** (1988)
Associate Professor of Animal Science and Station Veterinarian; D.V.M., University of Georgia, 1980.

Boy, Angelo V. (1965)
Professor of Education; A.B., University of Notre Dame, 1953; Ed.M., Boston University, 1955; Ed.D., ibid., 1960.

Boysen, Andrew A. (1998)
Assistant Professor of Music; B.M., University of Iowa, 1991; M.M., Northwestern University, 1993; D.M.A., Eastman School of Music, 1998.

Bozak, John C., Jr. (1967)
Thompson School Professor of Forest Technology; B.S., University of Connecticut, 1962; M.F., Yale School of Forestry, 1963.

Brannaka, Larry K. (1994)
Research Assistant Professor of Civil Engineering; B.S.C.E., Lehigh University, 1978; M.S.C.E., Colorado State University, 1980; Ph.D., Pennsylvania State University, 1993.

Brettschneider, Marla A. (1996)
Assistant Professor of Political Science and Women's Studies; B.A., State University of New York at Binghamton, 1986; M.A., New York University, 1988; Ph.D., ibid., 1993.

Briggs, Janet C. (1963)
Assistant Professor of Animal Science; B.S., University of Massachusetts at Amherst, 1962.

Brinker, Julie (1996)
Assistant Professor of Theatre and Dance; B.A., Oklahoma City University, 1985; M.F.A., Arizona State University, 1988.

Brockelman, Paul T. (1963)
Professor of Philosophy; A.B., Dartmouth College, 1957; M.A., Northwestern University, 1963; Ph.D., ibid., 1968.

Bronstein, Arna Beth (1981)
Associate Professor of Russian; B.A., Colgate University, 1975; M.A., University of Pennsylvania, 1979; Ph.D., ibid., 1986.

Brown, Benjamin C. (1996)
Assistant Professor of Sociology; B.A., Earlham College, 1987; M.A., Emory University, 1992; Ph.D., ibid., 1996.

Brown, Deborah (1976)
UNHM Associate Professor of English; B.A., Wellesley College, 1963; M.Ed., University of New Hampshire, 1975; Ph.D., ibid., 1976; M.F.A., Warren Wilson College, 1991.

Brown, Donna B. (1985)
Assistant Professor of the Humanities; B.A., Willamette University, 1966; M.A., Claremont Graduate School and University Center, 1971; Ph.D., ibid., 1978.

Brown, Roger S. (1974)
Associate Professor of German; A.B., Emory University, 1966; M.A., University of Kansas, 1969; Ph.D. ibid., 1971.

Brown, Warren R. (1972)
Associate Professor of Political Science and the Humanities; B.A., Willamette University, 1966; M.A., Claremont Graduate School and University Center, 1972; Ph.D., ibid., 1976.

Brown, Wendell S. (1974)
Professor of Earth Sciences and Earth, Oceans, and Space and Director of the Ocean Process Analysis Laboratory; B.S., Brown University, 1965; M.S., ibid., 1967; Ph.D., Massachusetts Institute of Technology, 1971.

Brunet, Stephen Andrew (1998)
Assistant Professor of Classics; B.A., Pomona College, 1976; M.A., University of Pittsburgh, 1978; Ph.D., University of Texas at Austin, 1998.

Buckley, Louise A. (1994)
Assistant Professor, Librarian; B.A., St. John's University, 1979; M.A., ibid., 1981; M.L.S., Rutgers University, 1992.

Bucklin, Ann C. (1992)
Director of UNH Sea Grant College Program and Professor of Zoology and Earth, Oceans, and Space and Genetics; A.B., Oberlin College, 1975; Ph.D., University of California at Berkeley, 1980.

Burdick, David M. (1992)
Research Assistant Professor of Marine Wetland Ecology and Restoration; B.S., Hobart College, 1977; Ph.D., Louisiana State University, 1988.

†**Burger, John F.** (1977)
Professor of Zoology; B.A., Grinnell College, 1962; M.Sc., University of Arizona, 1965; Ph.D., ibid., 1971.

Burton, Martha B. (1982)
Skills Application Teacher and Director of Mathematics Center; B.A., University of Rochester, 1958; M.S., ibid., 1960.

Byam, Martha A. (1992)
Instructor of Social Work; B.A., University of New Hampshire, 1975; M.S.W., University of Utah, 1979.

†**Caccavo, Frank, Jr.** (1997)
Assistant Professor of Microbiology; B.S., Long Island University, South hampton, 1989; M.S., University of New Hampshire, 1991; Ph.D., University of Oklahoma, 1995.

Calarco, John R. (1981)
Professor of Physics; B.S., George Washington University, 1963; M.S., University of Illinois at Urbana-Champaign, 1965; Ph.D., ibid., 1969.

Calculator, Stephen N. (1983)
Professor of Communication Disorders; B.A., State University of New York College at Oswego, 1974; M.S., State University of New York College at Geneseo, 1975; Ph.D., University of Wisconsin at Madison, 1980.

Camobreco, John F. (1995)
Assistant Professor of Political Science; B.A., State University of New York at Albany, 1987; Ph.D., State University of New York at Binghamton, 1996.

Campbell, Janet W. (1993)
Research Associate Professor of Earth Sciences and Earth, Oceans, and Space; B.A., Mary Baldwin College, 1966; M.A., Vanderbilt University, 1968; Ph.D., Virginia Polytechnic Institute and State University, 1973.

Caramihalis, Charles A. (1984)
Thompson School Associate Professor of Food Services Management; B.S., University of New Hampshire, 1981; M.Oc.Ed., ibid., 1987.

†**Carey, Gale B.** (1989)
Associate Professor of Nutritional Sciences; B.S., University of Massachusetts at Amherst, 1974; M.S., University of Wisconsin at Madison, 1976; Ph.D., University of California at Davis, 1981.

Carney, John J. (1973)
Associate Professor of Education; B.A., Seton Hall University, 1963; M.A., ibid., 1967; Ph.D., Syracuse University, 1973.

Carnicelli, Thomas A. (1967)
Professor of English and the Humanities; A.B., Princeton University, 1958; M.A., Harvard University, 1960; Ph.D., ibid., 1966.

Carr, Russell T. (1984)
Associate Professor of Chemical Engineering; B.S., Brigham Young University, 1980; M.S., University of Rochester, 1983; Ph.D., ibid., 1984.

Carroll, John E. (1974)
Professor of Environmental Conservation; A.B., Louisiana Technical University, 1966; M.A., Western Michigan University, 1968; Ph.D., Michigan State University, 1974.

Carter, Michael J. (1987)
Associate Professor of Electrical Engineering; B.S.E., University of Michigan at Ann Arbor, 1975; M.S., Stanford University, 1976; Ph.D., University of Michigan at Ann Arbor, 1984.
Celikkol, Barbaros (1969)
Professor of Mechanical Engineering and Ocean Engineering; B.A., Elon College, 1964; M.S., Stevens Institute of Technology, 1967; Ph.D., University of New Hampshire, 1972.
Cerullo, John J. (1983)
UNHM Associate Professor of History; B.A., University of Pennsylvania, 1971; M.A., ibid., 1976; Ph.D., ibid., 1980.
Chagnon, Matthew C. (1980)
Thompson School Associate Professor of Forest Technology; A.A.S., University of New Hampshire, 1979; B.S.F., ibid., 1986; M.S.F., ibid., 1988.
Chamberlin, Kent A. (1985)
Professor of Electrical Engineering; B.S., Ohio University, 1974; M.S., ibid., 1976; Ph.D., ibid., 1982.
†**Chandler, Donald S.** (1981)
Professor of Zoology and Curator; B.S., University of California at Davis, 1971; M.S., University of Arizona, 1973; Ph.D., Ohio State University, 1976.
Chasteen, N. Dennis (1972)
Professor of Chemistry; A.S., Flint Junior College, 1962; A.B., University of Michigan at Ann Arbor, 1965; M.S., University of Illinois at Urbana-Champaign, 1966; Ph.D., ibid., 1969.
Chaston, John M. (1989)
Associate Professor of Spanish; B.A., Brigham Young University, 1980; M.A., ibid., 1982; Ph.D., University of Texas at Austin, 1987.
Chiu, Monica E. (1998)
Assistant Professor of English; M.A., University of Binghamton, England, 1992; Ph.D., Emory University, 1996.
Christie, Drew (1981)
Associate Professor of Philosophy; B.A., Princeton University, 1974; M.S.L., Yale University Law School, 1978; Ph.D., Massachusetts Institute of Technology, 1983.
Chupp, Edward L. (1962)
Professor of Physics and Earth, Oceans, and Space; A.B., University of California at Berkeley, 1950; Ph.D., ibid., 1954.
Churchill, Joan W. (1994)
Associate Professor of Theatre and Dance; B.A., Ripon College, 1966; M.F.A., Carnegie Mellon University, 1968.
Cioffi, Grant L. (1980)
Associate Professor of Education; A.B., Stanford University, 1973; Ph.D., University of Minnesota, 1980.
‡**Clairmont, Richard E.** (1986)
Assistant Professor of Classics; B.A., University of New Hampshire, 1971; M.A., University of Virginia, 1973; Ph.D., Loyola University at Chicago, 1983.
Clark, Janine (1995)
Assistant Professor of Political Science; B.E.S., University of Waterloo, Canada, 1985; M.A., Carleton University, 1988; Ph.D., University of Toronto, Canada, 1994.
Clark, Mary Morris (1978)
Professor of English; B.A., University of New Hampshire, 1962; Ph.D., University of Massachusetts at Amherst, 1978.
Clark, Ronald R. (1957)
Professor of Electrical Engineering; B.S., University of New Hampshire, 1956; M.E., Yale University, 1957; Ph.D., Syracuse University, 1963.
Clyde, William C. (1998)
Assistant Professor of Geology; B.A., Princeton University, 1990; M.S., University of Michigan at Ann Arbor, 1993; Ph.D., ibid., 1997.
Cobb, Casey D. (1998)
Assistant Professor of Education; B.A., Harvard University, 1989; M.S., University of Maine at Orono, 1995; Ph.D., Arizona State University, 1998.
Cohn, Ellen S. (1978)
Professor of Psychology; B.A., Clark University, 1974; M.A., Temple University, 1976; Ph.D., ibid., 1978.
†**Collins, John J.** (1988)
Associate Professor of Biochemistry and Molecular Biology and Genetics; B.A., Colgate University, 1976; Ph.D., University of Wisconsin at Madison, 1984.
Collins, Michael R. (1985)
Professor of Civil Engineering; B.S.C.E., Virginia Polytechnic Institute and State University, 1970; M.S.S.E., ibid., 1972; Ph.D., University of Arizona, 1985.
†**Condon, William A.** (1976)
Professor of Animal Science; B.A., Merrimack College, 1965; M.S., University of Massachusetts at Amherst, 1968; Ph.D., ibid., 1975.
†**Congalton, Russell G.** (1991)
Associate Professor of Remote Sensing & Geographic Information Systems; B.S., Cook College, Rutgers University, 1979; M.S., Virginia Polytechnic Institute and State University, 1981; Ph.D., ibid., 1984.
Connors, Robert J. (1984)
Professor of English; B.A., University of Massachusetts at Amherst, 1973; M.A., Ohio State University, 1977; Ph.D., ibid., 1980.
Conroy, Andrew B. (1990)
Thompson School Associate Professor of Applied Animal Science; B.S., University of New Hampshire, 1986; M.S., Northwest Missouri State University, 1987.
Contarino, Michael (1993)
UNHM Assistant Professor of Political Science; B.A., Connecticut College, 1976; Ph.D., Harvard University, 1984.
Conway, Karen Smith (1987)
Associate Professor of Economics; B.A., Eastern Illinois University, 1982; Ph.D., University of North Carolina at Chapel Hill, 1987.
Cook, Raymond A. (1992)
Assistant Professor of Civil Engineering; A.B., University of Illinois at Urbana-Champaign, 1981; B.S.C.E., ibid., 1981; M.S.C.E., Cornell University, 1991; Ph.D., ibid., 1992.
Coon, Deborah J. (1995)
Assistant Professor of Psychology and Adjunct Assistant Professor of History; A.B., Bucknell University, 1976; M.A., University of Colorado at Boulder, 1980; M.A., Harvard University, 1985; Ph.D., ibid., 1988.
Cooper, Barbara T. (1978)
Professor of French; B.A., University of Wisconsin at Madison, 1966; M.A., ibid., 1967; Ph.D., ibid., 1974.
Corcoran, Ellen P. (1972)
Associate Professor of Education; B.A., Bryn Mawr College, 1962; M.A.T., New York University, 1968; Ph.D., ibid., 1972.
†**Cote, Rick H.** (1988)
Associate Professor of Biochemistry and Molecular Biology; B.S., Tufts University, 1974; Ph.D., University of Wisconsin at Madison, 1980.
Countway, Sylvia (1994)
Assistant Professor of Medical Laboratory Science; B.S., University of New Hampshire, 1965; M.Ed., ibid., 1981.
Craycraft, Catherine A. (1991)
Associate Professor of Accounting; B.A., University of Cincinnati, 1983; M.A., University of Missouri at Columbia, 1985; Ph.D., Ohio State University, 1991; C.P.A..
Crepeau, Elizabeth L. (1981)
Associate Professor of Occupational Therapy; B.S., University of New Hampshire, 1966; M.A., ibid., 1988; Ph.D., ibid., 1994.
Crill, Patrick M. (1988)
Research Associate Professor of Earth Sciences and Earth, Oceans, and Space; B.S., University of Massachusetts at Amherst, 1978; M.S., University of North Carolina at Chapel Hill, 1981; Ph.D., ibid., 1984.
Croce, Ronald V. (1986)
Professor of Kinesiology; B.S., Brooklyn College, City University of New York, 1973; M.Ed., Temple University, 1975; Ph.D., University of New Mexico, 1983.
Crosby, Peter R. (1987)
Assistant Professor, Librarian; B.A., Keene State College, 1971; A.M.L.S., University of Michigan at Ann Arbor, 1974; A.A.S., University of New Hampshire, 1977.
†**Crow, Garrett E.** (1975)
Professor of Plant Biology; A.B., Taylor University, 1965; M.S., Michigan State University, 1968; Ph.D., ibid., 1974.
Crowell, Diana M. (1997)
Assistant Professor of Nursing; A.D.N., Springfield Technical College, 1976; B.S.N., American International College, 1979; M.Ed., Springfield College, 1982; M.S.N., Anna Maria College, 1986; Ph.D., Union Institute, 1997.
Culbertson, Jerry A. (1998)
Faculty-in-Residence, Assistant Professor in Art; B.F.A., Kansas State University, 1991; M.F.A., Indiana University at Bloomington, 1995.
†**Curran-Celentano, Joanne** (1982)
Associate Professor of Nutritional Sciences; B.S., Rutgers, The State University of New Jersey, 1976; M.S., ibid., 1978; Ph.D., University of Illinois at Urbana-Champaign, 1982.
Daley, Patrick J. (1988)
Associate Professor of Communication; B.A., University of North Dakota, 1972; M.A., University of Iowa, 1975; Ph.D., ibid., 1983.
Davis, John Matthew (1993)
Assistant Professor of Hydrogeology; B.S., Montana State University, 1987; M.S., New Mexico Institute of Mining and Technology, 1990; Ph.D., ibid., 1994.
†**Davis, Thomas M.** (1984)
Associate Professor of Plant Biology and Genetics; B.S., California Polytechnic State University, 1980; Ph.D., University of California at Davis, 1985.
Dawson, John F. (1968)
Professor of Physics; B.S., Antioch College, 1958; Ph.D., Stanford University, 1963.
de Alba, Pedro A. (1977)
Professor of Civil Engineering; C.E., National University of Mexico, 1965; M.E., University of California at Berkeley, 1969; Ph.D., ibid., 1975.
de la Torre, Pilar (1989)
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Enrollment Statistics—Fall Semester

UNH-Durham	1995–1996	1996–1997	1997–1998	1998–1999
	(Men/Women—Total)			
Freshman	971/ 1495 — 2466	1075/ 1556 — 2631	936/ 1400 — 2336	869/1317 — 2186
Sophomore	1068/ 1347 — 2415	986/ 1412 — 2398	1072/ 1474 — 2546	980/1407 — 2387
Junior	996/ 1389 — 2385	1037/ 1332 — 2369	992/ 1384 — 2376	1012/1469 — 2481
Senior	1202/ 1512 — 2714	1118/ 1541 — 2659	1153/ 1504 — 2657	1073/1533 — 2606
1st Year—T.S.A.S.	173/ 129 — 302	179/ 102 — 281	176/ 103 — 279	153/92 — 245
2nd Year—T.S.A.S.	112/ 68 — 180	111/ 62 — 173	69/ 55 — 124	91/58 — 149
D.C.E.—A.A.	64/ 94 — 158	54/ 84 — 138	52/ 64 — 116	46/53 — 99
Graduate—Master's*	537/ 838 — 1375	539/ 849 — 1388	541/ 833 — 1374	518/798 — 1316
Graduate—Doctoral	236/ 183 — 419	235/ 182 — 417	199/ 202 — 401	195/193 — 388
Total	**5359/7055 — 12414**	**5334/7120 — 12454**	**5190/7019 — 12209**	**4937/6920 — 11857**
Graduate Continuing**	124/ 163 — 287	140/ 156 — 296	138/ 189 — 327	130/181 — 311
Grand Total	5483/ 7218 — 12701	5474/ 7276 — 12750	5328/ 7208 — 12536	5067/7101 — 12168
Continuing Education Credit	577/ 904 — 1481	521/ 890 — 1411	530/ 833 — 1363	535/769 — 1304
Summer Session	1368/ 2498 — 3866	992/ 1833 — 2825	1046/ 1994 — 3040	1066/1959 — 3025

Baccalaureate Curricula	1995–1996	1996–1997	1997–1998	1998–1999	1995–1996	1996–1997	1997–1998	1998–1999
	Life Sciences and Agriculture				Liberal Arts			
Freshman	466	474	426	417	1065	1078	1001	910
Sophomore	426	415	428	411	1034	1087	1143	1113
Junior	473	404	414	462	848	904	948	948
Senior	451	504	496	437	921	831	886	948
Total	**1816**	**1797**	**1764**	**1727**	**3868**	**3900**	**3978**	**3919**
	Engineering and Physical Sciences				Whittemore School			
Freshman	298	324	298	266	294	389	315	285
Sophomore	270	228	272	225	310	310	326	312
Junior	264	254	230	239	325	329	283	329
Senior	407	367	344	286	288	333	315	282
Total	**1239**	**1173**	**1144**	**1016**	**1217**	**1361**	**1239**	**1208**
	Health and Human Services							
Freshman	343	366	296	308				
Sophomore	375	358	377	326				
Junior	475	478	501	503				
Senior	647	624	616	653				
Total	**1840**	**1826**	**1790**	**1790**				

UNH-Manchester	1995–1996	1996–1997	1997–1998	1998–1999
		(Men/Women—Total)		
Associate	90/149 — 239	88/ 149 — 237	89/149 — 238	117/347 — 464
Baccalaureate	147/322 — 469	139/ 343 — 482	129/362 — 491	114/160 — 274
Total	**237/471 — 708**	**227/492 — 719**	**218/511 — 729**	**231/507 — 738**
Continuing Education Credit	227/288 — 515	241/278 — 519	200/257 — 457	172/220 — 392

*Master's counts include Certificate of Advanced Graduate Study.

**Beginning fall 1995, the degree candidate category of "graduate continuing enrollment" has been added. For consistency and comparisons with previous years, the totals in boldface should be used.

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Campus Map and Key

Residence and Dining Halls

1 Hetzel Hall
2 Alexander Hall
3 Fairchild Hall
4 Huddleston Dining Hall
5 Englehardt Hall
6 Hunter Hall
7 Gibbs Hall
8 Devine Hall
9 Randall Hall
10 Hitchcock Hall
13 Babcock House
23 Hubbard Hall
24 Philbrook Dining Hall
25 Christensen Hall
26 Williamson Hall
27 Mini-dorms
33 Smith Hall
34 Sawyer Hall
35 Scott Hall
36 Stoke Hall
37 Stillings Dining Hall
39 Jessie Doe Hall
40 Lord Hall
41 McLaughlin Hall
42 Congreve Hall

Apartment Complexes

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61 Woodside Apartments
70 The Gables

Academic Buildings

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19 Hamilton Smith Hall
21 Horton Social Science Center
22 Parsons Hall
29 Kingsbury Hall
30 Paul Creative Arts Center
31 Dimond Library
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44 Murkland Hall
45 DeMerritt Hall
46 James Hall
47 Conant Hall
48 Hewitt Hall
49 Spaulding Life Sciences Center
50 Rudman Hall
51 Morse Hall
53 Pettee Hall
54 Taylor Hall
55 Kendall Hall
56 Nesmith Hall
57 New Hampshire Hall
63 Human Nutrition Center
64 Ocean Engineering Building
67 Greenhouses
68 Putnam Hall
69 Barton/Cole Halls
71 Equestrian Center

Administrative Offices/Support Services

14 Wolff House
15 Health Services
16 Pettee House
17 Verrette House
18 Grant House, Office of Admissions
20 Hood House
32 Thompson Hall
52 Zais Hall
60 Elliott Alumni Center
66 Visitor Information Center

Student Activities/Lodging

11 Memorial Union Building
38 The New England Center
58 Whittemore Center
59 Athletic Arena
62 Dairy Bar
65 Field House

Frequently Called Numbers

Directory Assistance and Information
University operators ..... (603) 862-1234 (off-campus)

Dial 0 (on campus)

Office of Admissions 862-1360
Financial Aid Office 862-3600
Department of Housing 862-2120
Business Services 862-2230
Registration and Records 862-1505

Academic Advisers
College of Liberal Arts 862-2064
College of Engineering and Physical Sciences 862-1783
School of Health and Human Services 862-1177
College of Life Sciences and Agriculture 862-1451
Whittemore School of Business and Economics 862-3885
Thompson School of Applied Science 862-1025

Health Services 862-1530
Honors Program 862-3928
Orientation Scheduling 862-4318
E-mail: First.Year@unh.edu
Memorial Union and Information Center 862-2600
Off-Campus Housing 862-3612
Traffic Services/Parking 862-1010
University Police 862-1427
Accessing Career Challenges in Education through Specialized Service (ACCESS) Office 862-2607
Office of Multicultural Student Affairs 862-2050
The Whittemore Center 862-1379
Campus Recreation 862-2031
Athletics 862-1850

WEB: http://www.unh.edu/

Directions to Campus

By Car From Boston, Mass. Follow I-95 North. When approaching the Portsmouth, N.H., area, take the exit bearing left, marked "NH Lakes and White Mountains, Routes 4 & 16." Continue on that road to Exit 6W (Concord-Durham) and follow Route 4 West. Exit at 155A and turn toward Durham. Follow 155A through a short stretch of farmlands and fields to the UNH campus.

From Hartford, Conn. Take I-84/I-86 East out of Hartford to the Mass. Pike (I-90) to Auburn Exit 10 then East on I-290 to I-495 North. Drive east on I-495 North, Exit 26. Continue north on I-95, then follow the directions above for driving from Boston.

From Portland, ME. Follow either I-95 or Route 1 South to the Portsmouth traffic circle. Take the Spaulding Turnpike north to Exit 6W (Concord-Durham). Then follow the directions above for driving from Boston.

From Concord, N.H. Follow Route 4 East, and take the UNH/Durham exit at 155A. Follow a short stretch of farmlands and fields to the UNH campus.

From Manchester, N.H. Take Route 101 to the junction of Route 125. Follow Route 125 North to the Lee traffic circle. Drive east on Route 4, and then follow the directions above for driving from Concord.

By Plane From Logan International Airport, Boston, you may use the C & J Trailways Airport Bus Service. Advance reservations are not required. For further information call (603) 742-5111 or, outside New Hampshire, (800) 258-7111.

By Bus Depart C & J Trailways Bus Lines across from South Station in Boston. For further information call (603) 742-5111 from New Hampshire or (800) 258-7111 outside of New Hampshire.

Summer Session 1999

May 24–August 6

Semester I

August 27, Friday
Residence halls open for new freshmen

August 29, Sunday
Residence halls open for upperclass students

August 30, Monday
Classes begin

September 6, Monday
Labor Day holiday

September 10, Friday
Last day to withdraw and qualify for 3/4 tuition refund

September 11, Saturday*
Rosh Hashanah

September 17, Friday
Last day to add courses without dean's approval and without $25 late add fee
Last day to drop courses or change to audit without $25 late drop fee
Last day to choose pass/fail option

September 20, Monday*
Yom Kippur

September 24, Friday
Last day to file an Intent to Graduate form for Dec. 1999 graduation without late fee

October 1, Friday
Last day to withdraw or drop to part time and qualify for 1/2 tuition refund
Last day to drop courses or change to audit ($25 per course late fee continues to apply)
Last day to carry more than 20 credits without a surcharge

October 11, Monday
Fall break, no classes

October 15, Friday
Midsemester
Last day to withdraw from the University without grades of WP or WF

November 2, Tuesday
Election Day—no exams can be scheduled

November 11, Thursday
Veterans Day holiday—no classes

November 23, Tuesday
Classes follow Thursday schedule

November 24, Wednesday
Classes follow Monday schedule

November 25–26, Thursday–Friday
Thanksgiving holidays

November 29, Monday
Classes resume

December 3, Friday
Last day an announced oral or written exam may be given before final exam period

December 10, Friday
Last day of classes

December 13, Monday
Reading Day—no classes. Final exams begin 6 P.M.

December 18, Saturday
Final exams end

December 24, Friday
Christmas holiday—offices closed

December 31, Friday
Graduation date (no ceremony)

Semester II

January 16, Sunday
Residence halls open

January 17, Monday
Martin Luther King, Jr. holiday—offices closed

January 18, Tuesday
Classes begin

January 28, Friday
Last day to withdraw and qualify for 3/4 tuition refund

February 4, Friday
Last day to add courses without dean's approval and without $25 late add fee
Last day to drop courses or change to audit without $25 late drop fee
Last day to choose pass/fail option

February 11, Friday
Last day to file an Intent to Graduate form for May 2000 graduation without late fee

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February 18, Friday
Last day to withdraw or drop to part time and qualify for 1/2 tuition refund
Last day to drop courses or change to audit ($25 per course late fee continues to apply)
Last day to carry more than 20 credits without a surcharge

March 10, Friday
Midsemester
Last day to withdraw from the University without grades of WP or WF

March 13–17, Monday–Friday
Spring Break

March 20, Monday
Classes resume

April 20, Thursday*
Passover

April 21, Friday*
Good Friday

April 28, Friday*
Orthodox Good Friday

May 1, Monday
Last day an announced oral or written exam may be given before final exam period

May 8, Monday
Last day of classes

May 9–10, Tuesday–Wednesday
Reading Days—no classes

May 11, Thursday
Final exams begin

May 18, Thursday
Final exams end

May 19, Friday
Senior Day

May 20, Saturday
Commencement (10:00 A.M.)

Summer Session 2000

May 22–July 28

The University reserves the right to modify this calendar subsequent to printing. Refund deadlines may change from those in this calendar.

* These holidays, important to many members of the University community, are not University holidays, but they are listed here to facilitate planning of University events. Faculty and staff should be sensitive to the needs of those who celebrate these and other holidays.

Bulletin of the
UNIVERSITY OF
NEW HAMPSHIRE

Office of University Publications
Schofield House
8 Garrison Avenue
Durham, NH 03824-3556

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